

CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.

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\$3.00 per Year

Foss

Sets the pace
in Quality and Service



Tungsten Hack Saw Blades

Fast and Cool Cutting, Durable and Uniform. Vitrified Silica or Semi-Vitrified and Elastic Process.

"FOSS" Service gives special attention to using the right wheel in the right place. We have a large stock of shapes and qualities on hand for prompt shipment.

Gray 22" x 22" Spur Craved Planer

Gray Planers are built by a firm that makes nothing but planers. They are given the entire time and attention of a large organization—and their performance shows it.

The parts are so proportioned and the metal so distributed that the planer is quick acting and simple in operation, and yet sufficiently stiff, strong and powerful to perform a great portion of the work for which larger, heavier and more clumsy planers are ordinarily used.

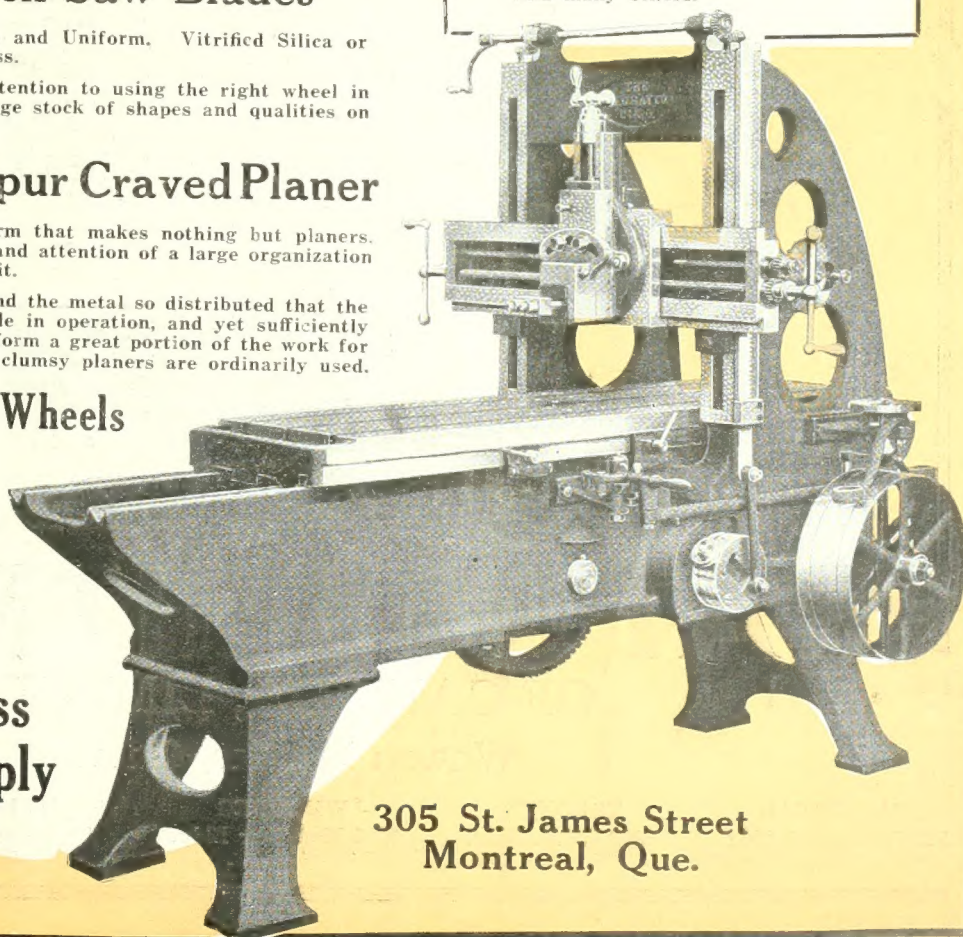
Superior Grinding Wheels

They master all cutting-off difficulties. Efficiency and economy are the two things for to-day, and TUNGSTEN HACK SAW BLADES, from this standpoint, are the best that can be bought.

WE ARE REPRESENTATIVES FOR THE FOLLOWING LINES:

TUNGSTEN SAW BLADES.
MOORE BROS. FILES.
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McARTHUR BELTINGS.
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KEMPSMITH MILLING MACHINES.
SEBASTIAN LATHES.
MONARCH LATHES.
CHAMPION TOOLS.
SILVERS DRILLS.
SWEETLAND CHUCKS.
SMITH & MILLS SHAPERS

And many others.



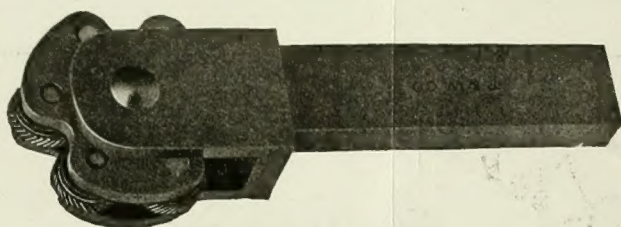
The Geo. F. Foss
Machinery & Supply
Co. Limited

305 St. James Street
Montreal, Que.

CANADIAN MACHINERY

SMALL TOOLS

P. & W. Combination Lathe Knurling Tools



PROMPT SERVICE

is assured at our present
store where P.W. Small
Tools are carried in
stock. Place your order
there to-day.

Combines Three Distinct Knurling Tools in One

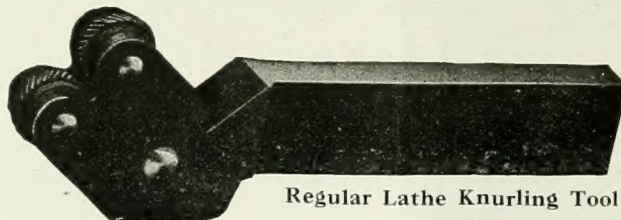
You will save time by using this three-
in-one Lathe Knurling Tool.

It carries
three pitches
of knurls
fine, medium



FINE MEDIUM COARSE

and coarse, as shown in sample. This
does away with necessity of having
three holders or of changing knurls
where but one holder is available. Same
knurls can be used in this holder as are
used in our regular Lathe Knurling
Tool.



Regular Lathe Knurling Tool

Precision Machine Tools --- Standards & Gauges

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HALIFAX
Davidson Building

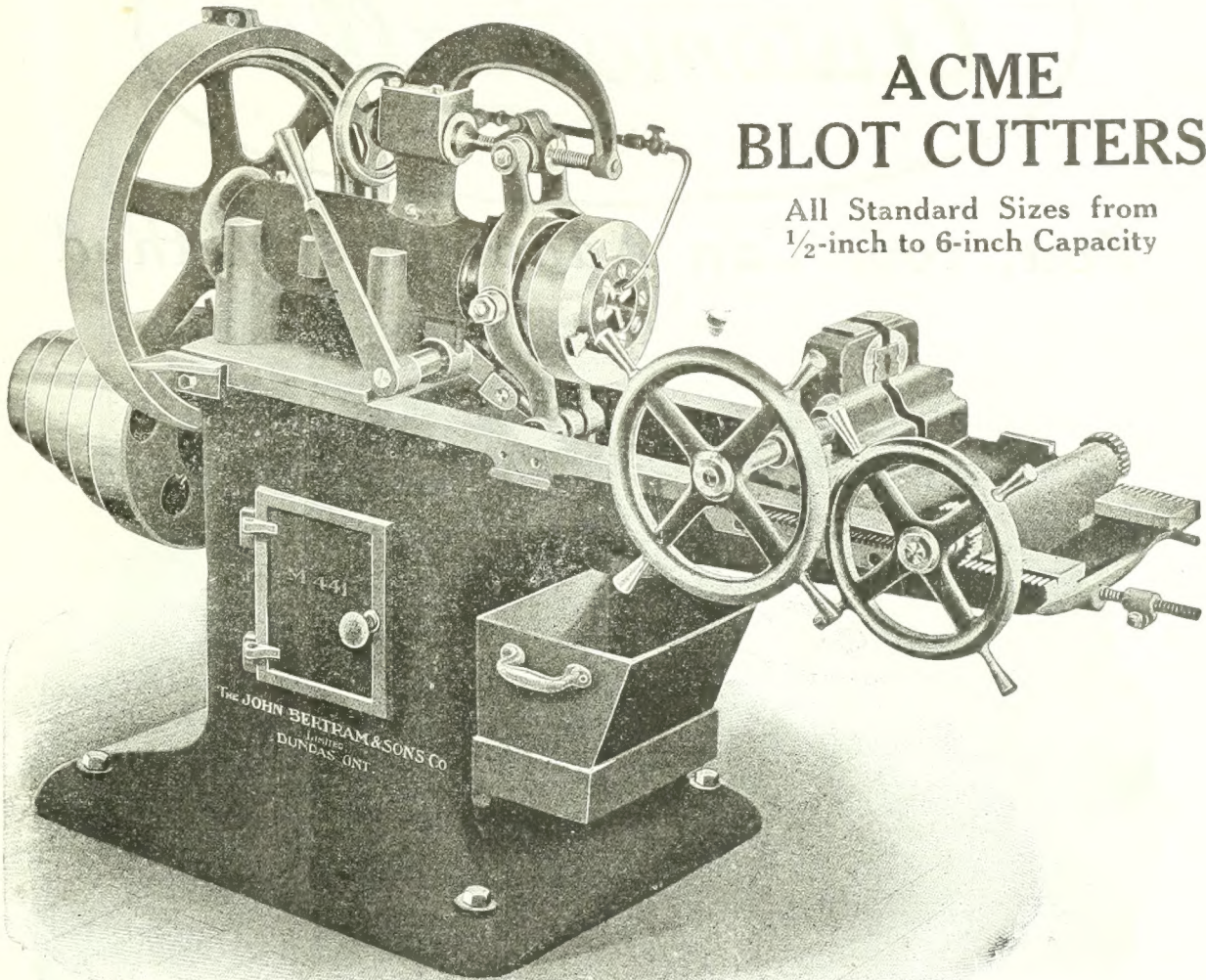
VANCOUVER
B.C. Equipment Co.



BERTRAM MACHINE TOOLS

ACME BLOT CUTTERS

All Standard Sizes from
1/2-inch to 6-inch Capacity



Supplied with Leadscrew Attachment for Stay Bolts or other work requiring special Accuracy of Pitch.

WRITE US FOR FULL DETAILS ON ANY MACHINE
OR MACHINES IN WHICH YOU ARE INTERESTED

The John Bertram & Sons Company Limited

DUNDAS, ONTARIO, CANADA

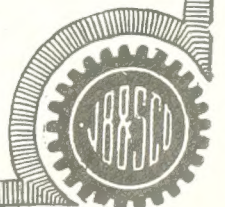
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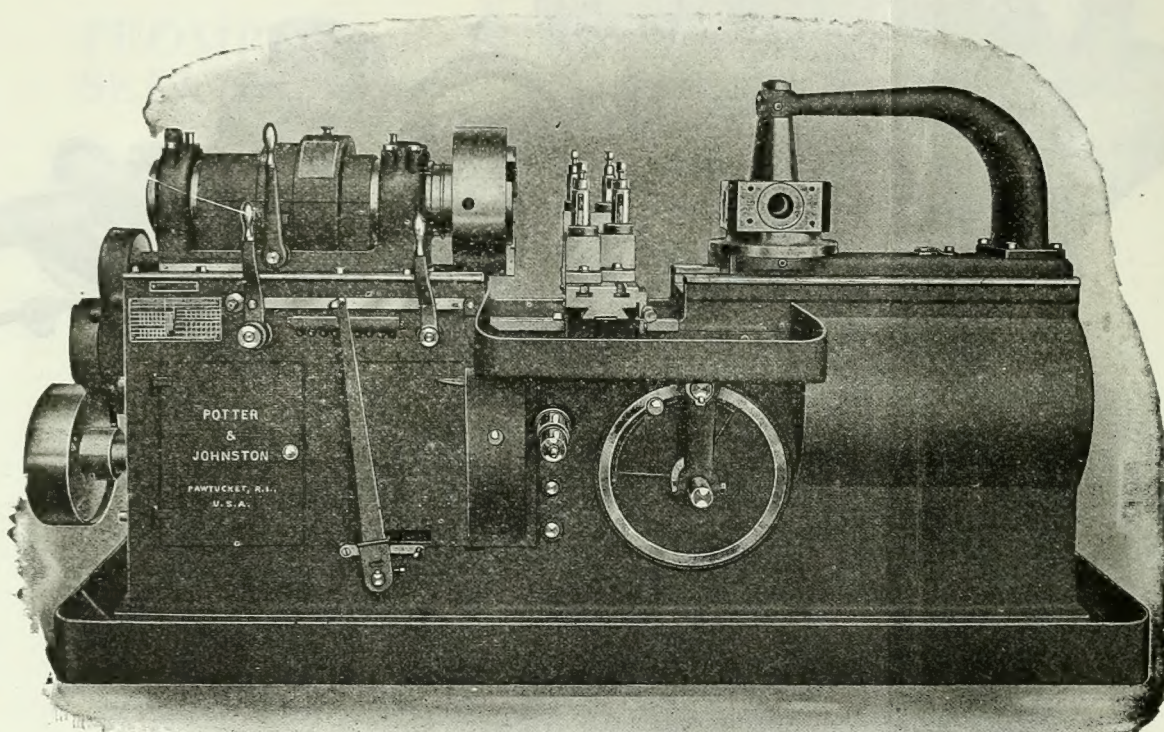
WINNIPEG
1205 McArthur Bldg.



POTTER & JOHNSTON

*"Do it
Automatically"*

You, too, Can Adopt this Method



6A — MANUFACTURING AUTOMATIC

When, back in the Middle Ages, a Frenchman mounted a piece of wood between two supports in such a way that it could be revolved against a cutting edge, the history of machine tools began.

With from two to a dozen cutting tools in simultaneous operation, with the operator only required to place the piece in the chuck and remove the finished piece, the machine tool has reached its highest development from a labor-saving, time-saving

standpoint in the Potter & Johnston Manufacturing Automatic.

More and more shops, big, progressive shops, are realizing this fact; that they cannot do their manufacturing work so economically in any other way as on the Potter & Johnston Manufacturing Automatics. Some shops have fifty of these machines in use, some seventy-five or a hundred, and even three hundred. In one shop—think of it. Why don't you adopt that "Do It Automatically" method. **Ask for Bulletin 39.**

Canadian Offices: POTTER & JOHNSTON MACHINE CO.,

ROELOFSON MACHINE & TOOL CO., LIMITED

Head Office: 1501 Royal Bank Building, Toronto, Canada

Works and Warehouse: Galt, Ont., Canada

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SULPHATE
of AMMONIA

"HAMILTON" PIG IRON
Basic Malleable Foundry

STEEL & IRON CARS
OPEN HEARTH
STEEL SHEETS

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Car Axles
Shape and Drop
Forgings
Carriage and
Automobile
Hardware

POLE LINE HARDWARE

(Black and Galvanized)

Pole Steps
Cross Arm
Braces
Guy Clamps
Guy Rods

SCREWS

Steel, Brass
and
Bronze
Wood and
Machine
Screws

NAILS, SPIKES & RIVETS

Wire
Cut
Boat and Horse
Shoe Nails
Railway
Pressed and
Drift Spikes
Tacks
Shoe Nails
Steel and
Copper Rivets
Burrs

Purchase the Products of Canadian Mills

TO uphold the Glory we have jointly earned—to honor our noble dead—to comfort the wounded, and extend to the men returned the hand of prosperous welcome, we must cast aside all forebodings and face the future with unbounded courage and confidence and, without a shadow of doubt, declare to the World that this Nation, which was so quickly and successfully transformed to a War basis, can be depended upon to revert to Peace conditions with equal success. The buyer and seller must recognize their duty to the Nation and co-operate fully to the end that all products that can be produced in Canada by Canadian workmen shall not be purchased elsewhere.

OUR Duty is plain; Canada with Canadian labor and capital can produce, manufacture and distribute products sufficient to keep the wheels of industry turning to the limit. The song of Prosperity and Happiness should ring out all over the land. Let us sincerely pledge to the extent of our needs, to purchase materials produced in Canada by Canadian Workmen, and the result of our efforts will return to us the Blessings of a Prosperous and Happy Nation.

THE STEEL COMPANY OF CANADA

LIMITED
HAMILTON

MONTREAL

RAILROAD TRACK MATERIAL

Angle Bars
Track Bolts
Tie Plates
Tie Rods
Spikes

WROUGHT PIPE

Black Pipe
Galvanized
Pipe
Nipples
Couplings

LEAD PRODUCTS

Lead Pipe
White Lead
Shot
Putty

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Steel & Brass
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Heavy and Fine
Bright Annealed
Coppered
Galvanized and
Tinned
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Steel and Copper
Cable
Clothes Line
Staples
Barb Wire
Woven Wire
Fencing
Vence Gates

Bars

Blooms

Billets

Wire

Sheets

Horse Shoes

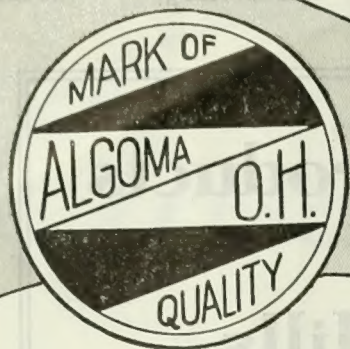
Wire Rods

Angles

Channels

Plow Beams

ALGOMA STEEL CORPORATION, LTD.



SAULT STE. MARIE
ONTARIO

STEEL RAILS

Open Hearth Quality
(All Sections from 12 lbs
to 100 lbs per yard)

SPLICE BARS

STEEL TIE PLATES

PIG IRON BASIC, FOUNDRY- BESSEMER

SULPHATE OF AMMONIA

BLOOMS, BILLETS, SLABS,

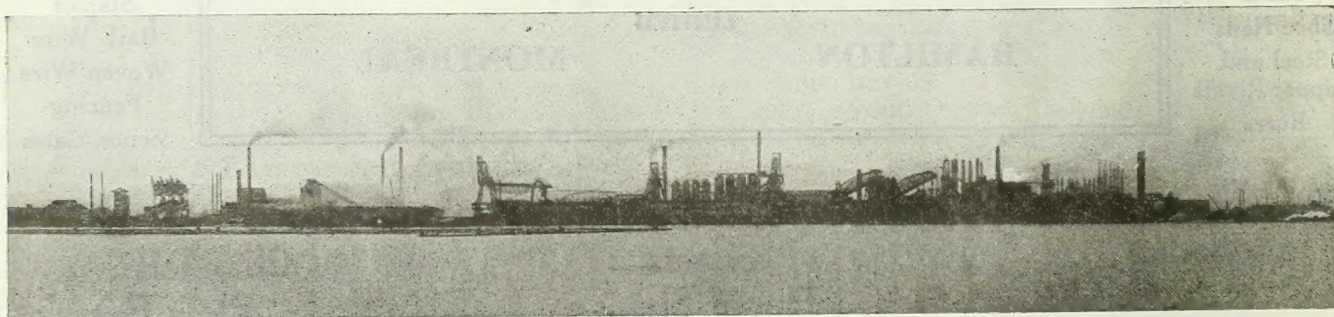
STRUCTURAL STEEL

MERCHANT BARS

CONCRETE REINFORCING BARS

IRON, BRASS AND BRONZE CASTINGS

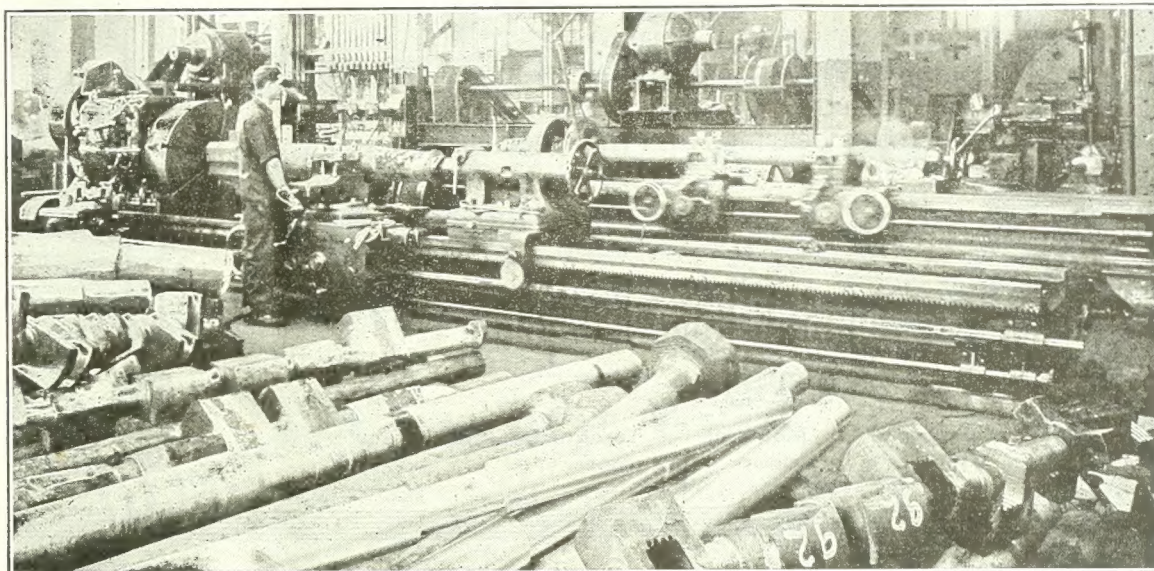
Sulphuric Acid. Nitre Cake.



General View of the Plant of the Algoma Steel Corporation from the Waterfront.

BRIDGEFORD

Heavy Duty Lathes



The above photograph shows a Bridgeford 27" Manufacturing Lathe finish boring a cast-iron transmission housing for the new Fordson Tractor.

The diameter of housing is $19\frac{1}{8}$ " and the limits of accuracy are .002".

Maximum production is a requirement in the Ford plant and that is why a Bridgeford was selected to do the work. The Bridgeford turns out

30 pieces per day of 8 hours, which is excellent production.

There's a Bridgeford for every heavy duty lathe requirement. Bridgefords are in operation in all parts of the world on all kinds of duty. The line includes Heavy Geared Head Engine Lathes from 24" to 72" swing, Cone Driven Engine Lathes, Axle and Journal Truing Lathes and Manufacturing Lathes of 27" and 30" Swing.

Send for interesting data on Bridgeford Lathes.
We are in a position to make prompt deliveries.

BRIDGEFORD MACHINE TOOL WORKS

161 Winton Road
Rochester, N.Y.

Manufacturers of Heavy Duty Lathes for more than 20 years

BRIDGEFORD

Less Overhead Expense

Whenever a strong, dependable hoist is needed, the "Imperial" air motor hoist fills the bill.

Few Parts Mean Less Trouble

The "Imperial" has few parts

The motor is completely balanced; the sensitive control allows the load to be raised or lowered a fraction of an inch at a time. Ball and roller bearings and thorough lubrication insure long wear.

Bulletin 8006 will interest you.

Canadian Ingersoll-Rand Company Limited

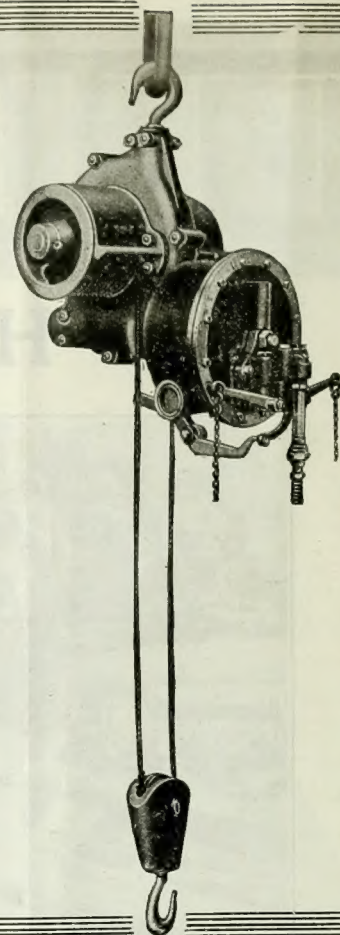
Sydney

**Sherbrooke
Winnipeg**

**Montreal
Nelson**

Toronto
Vancouver

Cobalt



**Swedish Steel & Importing
Co., Limited**

Montreal
New York

Direct representatives of foremost Swedish mills; makers of

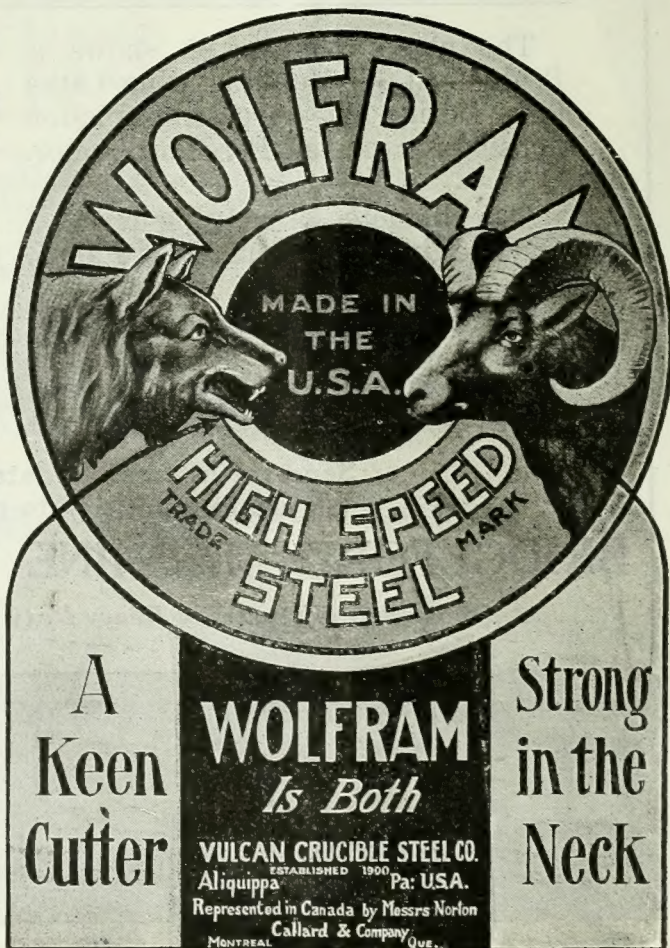
Toronto
Denver

Tool Steels

**ALLOY STEELS, BILLETS,
BARS, DISCS, SHEETS,
HIGH SPEED STEELS,
DRILL RODS, DRAWN
BARS, SEAMLESS TUB-
ING, COLD ROLLED STRIP
STEEL, WELDING WIRE,
WROUGHT AND ROLLED
IRON, PIG IRON, STEEL
AND IRON ENDS, HOL-
LOW AND SOLID MINING
DRILL STEEL.**



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from large stock



WILT

**HIGH SPEED AND CARBON
TWIST DRILLS
REAMERS AND MILLING CUTTERS**

Quality First

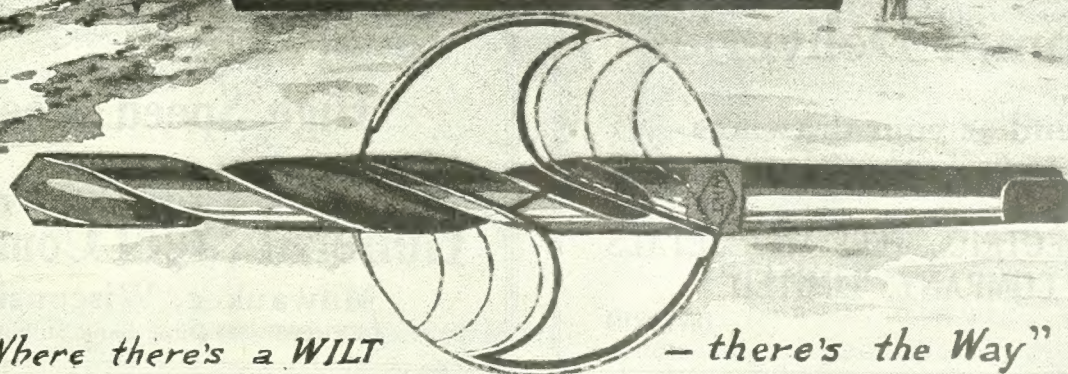
**The Keystone Upon Which All WILT
Products Are Built**

A high standard of perfection is maintained throughout the various processes of manufacturing WILT High Speed and Carbon Twist Drills, Reamers and Milling Cutters. WILT products improve production! This is no theory, no untested statement, but an established fact backed by many of the largest manufacturers throughout Canada. For steady, reliable output of work that is satisfactory from the standpoint both of quantity and quality there is no better choice than WILT Products.

Put them to the Test

WILT TWIST DRILL COMPANY

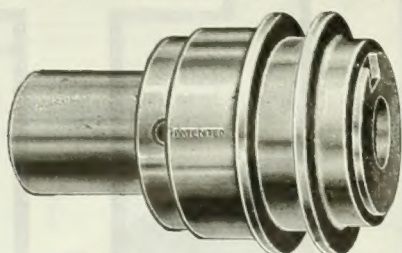
OF CANADA, LTD. WALKERVILLE, ONT.
London Office: Wilt Twist Drill Agency, Moorgate Hall,
Finsbury Pavement, London, E.C. 2, England.



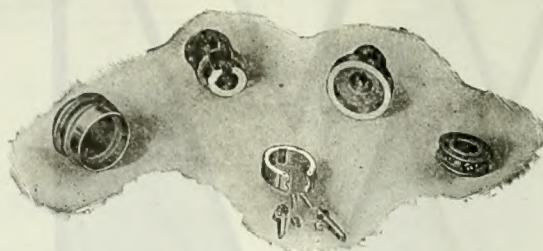
"Where there's a WILT

- there's the Way"

THE JOHNSON FRICTION CLUTCH



SINGLE CLUTCH—EXTERIOR



HAS FEW PARTS

each being interchangeable. Did you ever see a clutch with so few parts? The Johnson friction clutch is simple, small, compact, round, smooth and powerful. It is the clutch you have been looking for. For the overhead shafting, line shafts or countershafts it gives perfect satisfaction. As a part of the various machine tools on the market it is an important factor. Study the construction of the Johnson Friction Clutch. What are your requirements? Get our booklet, "Clutches as Applied in Machine Building." It shows what the other fellow is doing." Also

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THE CARLYLE JOHNSON MACHINE CO. MANCHESTER, CONN.



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High Grade STEEL Castings
Of Every Description

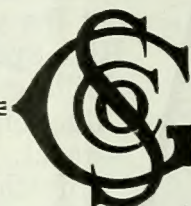
Prompt Deliveries

Send us your drawings
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Forging Billets and Bars Electric Furnace, Alloy Steels Die Blocks

Annealed—Heat Treated

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Rough Turned—Annealed—Heat
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WE are builders of every description of RAILWAY TRACKWORK either as ready-to-lay intersections, complete in every detail, or as components, such as Frogs, Switches, Mates, Diamonds, Gosses, Guards, and so on. We build layouts to purchaser's designs, or we survey the site, design the layout and build it under his supervision.

Manufacturers of Balkwill Articulated Cast Manganese Crossings

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Electrite

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

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ELECTRIC STEEL CO.
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High Speed Steel

uranium

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*We Make in
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Lead Pipe—Sheet Lead
Wire Solder, Bar Solder,
Ribbon Solder.

Babbitt Metal
For All Requirements

INGOT METALS

Copper—Tin—Lead
Aluminum and Brass

Everything in Metals

Wherever you are we
can serve you.

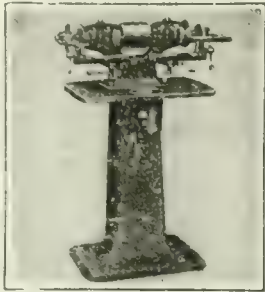


THE CANADA METAL, CO., LIMITED
Toronto, Montreal, Winnipeg, Vancouver

FORD-SMITH

GRINDERS

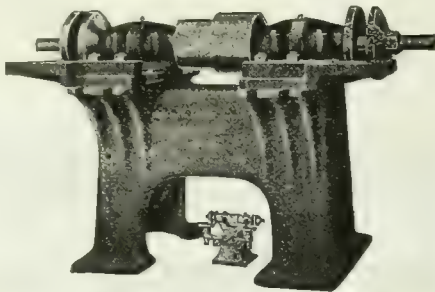
FOR EVERY
CLASS OF WORK



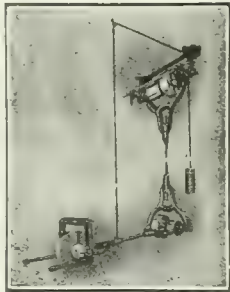
General Purpose Grinder



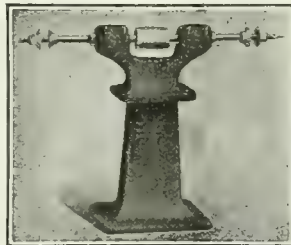
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Heavy Type Floor Grinders



Swing Grinder



Polisher and Buffer

Modern, rigid, well-balanced machines
that give real grinding service.

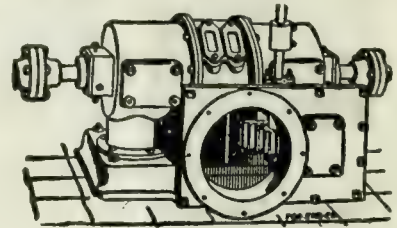
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The Ford-Smith Machine Co.

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WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

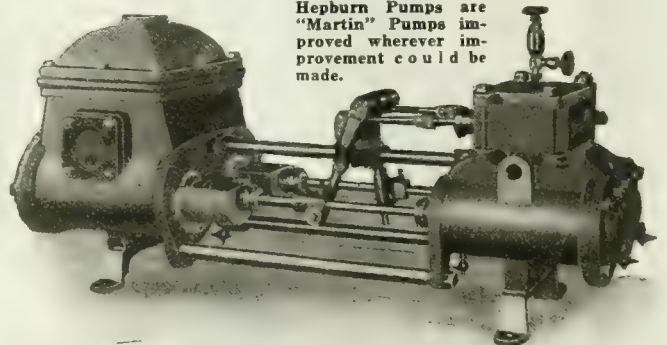
We solicit your inquiries.

J. C. WILSON & CO.
BELLEVILLE, ONTARIO

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are
"Martin" Pumps im-
proved wherever im-
provement could be
made.



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STEEL *for* Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

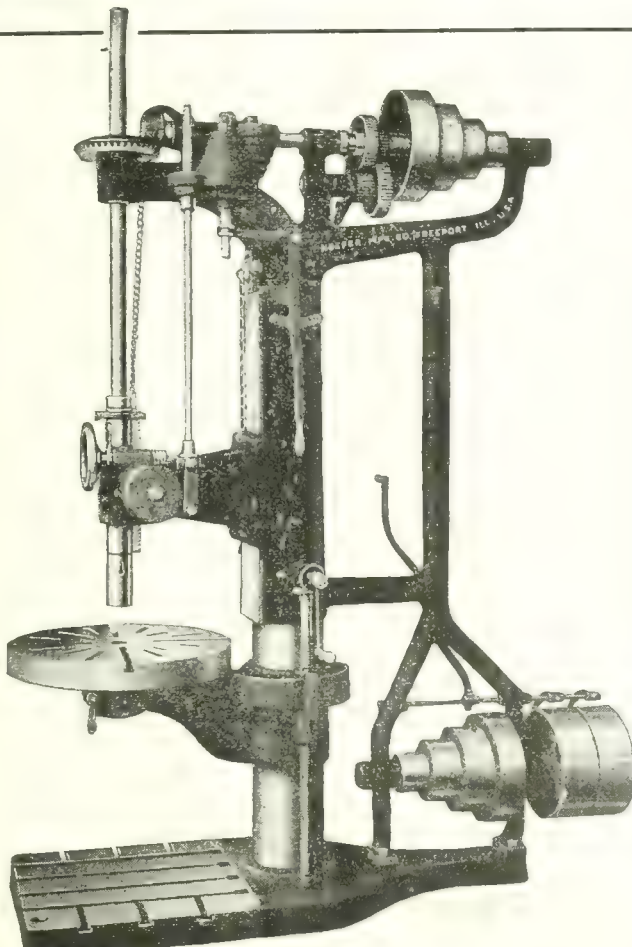
We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

**Nova Scotia
Steel and Coal
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Head Offices:
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Steel Ingots
by the
HARMET
Liquid Process



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And know-how is a lot different from know-it-all. The Hoefler engineers are eternally plugging away to make a better driller.

This is the spirit you'll like in Hoefler service. If you will set your drilling needs before us, we'll give you the benefit of twenty-five years' contact with some of the drilling problems of the biggest manufacturers in the country.

Our product, Hoefler Drillers, embodies the latest word in design, efficiency and accuracy.

Regardless of the size of the press, drilling is possible to a fine degree of precision, provided you use Hoefler Drillers, the recognized standard for a quarter of a century.

Catalog showing complete line on request.

HOEFER MFG. CO.

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A GREAT MAN wrote this: "I'm called away by particular business, but I leave my character behind me." And nobody had to guess whose character it was. Even if the familiar Red Cut label should disappear there would be no doubt as to the character of the steel that remained. More than ever would the quality shine forth in the results when it was worked. Adherence to the highest standard with an unvarying uniformity has placed a well merited reputation all its own on

Red Cut Superior

The Nationally Known—First Quality
HIGH SPEED STEEL
The Best For All Machine Work

**VANADIUM-ALLOYS
STEEL CO.**

General Offices : Pittsburgh, Pa.
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No effort is required in the selling of "Famous Five" files. One doesn't have to spend time explaining their merits.

Customers know they are standard tools before they come in to buy.

If you carry a reasonable stock of the various shapes and sizes you cannot help but make sales.

They are:

**KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE**

Made in Canada by

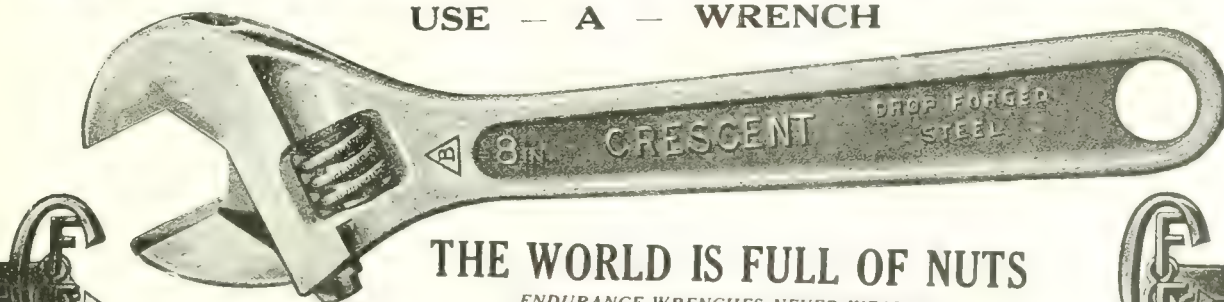


NICHOLSON FILE CO.
PORT HOPE
ONTARIO

CANADA FOUNDRIES & FORGINGS LIMITED

DON'T RATTLE

USE — A — WRENCH



THE WORLD IS FULL OF NUTS

ENDURANCE WRENCHES NEVER WEAR OUT

CANADIAN BILLINGS & SPENCER PLANT - Welland, Canada

Crucible

AND

Open Hearth Steel

Tool Steel

"ARGO" BRAND HIGH-SPEED STEEL

The John Illingworth Steel Co.

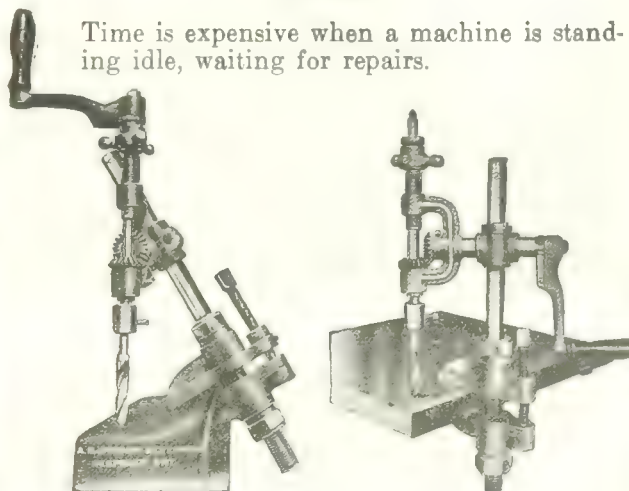
1856

Frankford,
New York Office

Phila.
217 Broadway

RALPH B. NORTON, AGENT
Montreal, Canada

Jardine Universal Ratchet Drill



Time is expensive when a machine is standing idle, waiting for repairs.

On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, \$26.50 net

Sold by all Machinery and Supply Houses

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HIGH SPEED STEEL

INTRA STEEL

GIBRALTAR STEEL

Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc.,

Music Wire for Springs, Steel Balls.

Cold Rolled Mild Steel for Shafting, Etc.

Circular Saws, Machine Knives

Pilot Steel & Tool Company, Limited

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Insures Maximum Production

FIRTH'S CARBON TOOL STEELS

Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES | 449 St. Paul St. West, MONTREAL
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High Speed Steel

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“Double Waco” Quality—for
Quick Production Work.

“Turtle Brand”—High-class
Tool Steels, Files and Drills.

Wortle Plates for Wire Drawers.

MANUFACTURED BY

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Established 1870

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“Frost King”
“Trojan”
“Nickle Genuine”
BABBITS

Hoyt Metals have been used with great success for
many years.

Put them to the test and you'll soon see a difference in
your babbitt cost.

All elements entering into our mixtures are carefully
refined and put together in such proportions and in such
relation to each other that the best possible alloy is
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Annual sales over \$5,000,000.

Hoyt Metal Co., Toronto

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THE



FOUNDRY

GALT - ONT.

Do Your Castings Cost Too Much?

A rearrangement of your patterns might cut their cost 25%; a different method of molding them might double your production at no increase in molding cost. We can advise you and we have expert metal and wood pattern-makers who are able to make any changes that may commend themselves to you.

If you need some new Patterns

send us a sample, blueprint or sketch, and ask for our advice. It won't cost you anything. If our advice is good and commends itself to you, it is only fair to assume that our work will be equally satisfactory, and we need the work as badly as you need the patterns.

We are in a position to do turning, boring, drilling or other semi-finishing operations on castings supplied by us.

ASK US

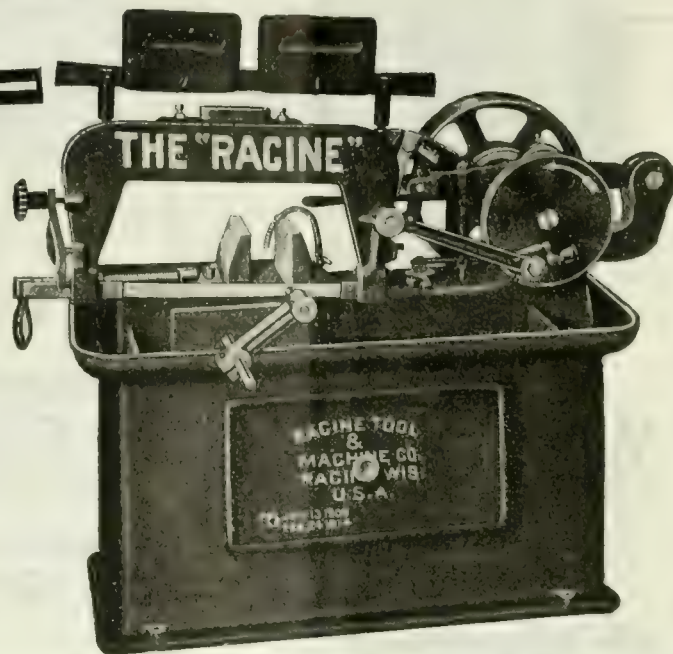


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High Speed Metal Cutting Machine
Standard the World Over



This is the only machine in the World that has an ABSOLUTELY POSITIVE AUTOMATIC LIFTING DEVICE, a feature secured by patents. Another feature is the rigid saw frame guide. These two assets combine to give long life to the cutting blades and save a lot of money.



"THE RACINE" minimizes wastage, cuts accurately and with great speed. Then they are easy and cheap to operate. These features are appreciated by the best shops everywhere and that's why "THE RACINE" sets the "Standard the World Over." Write for full particulars.

Use "RACINE" H.S. Tungsten-Power Blades.

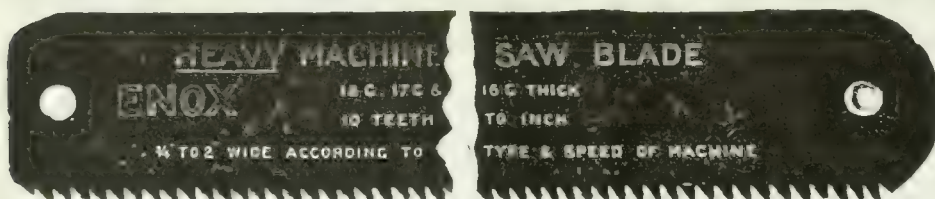
RACINE TOOL & MACHINE COMPANY
Melbourne Ave. — — RACINE, WIS., U.S.A.

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HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

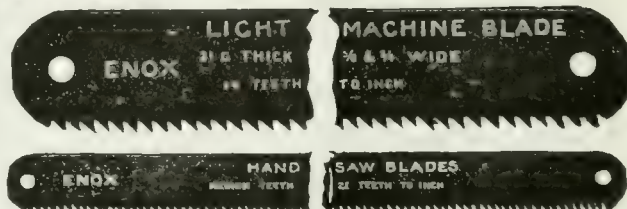
Simonds Canada Saw Co. Limited
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ENOX

Hacksaw Blades

ARE THE BEST



AGENTS IN CANADIAN TOWNS WANTED

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Starrett Hack Saws

Are more than mere hack saws. Each blade is a cutting tool designed for a specific grade of work. Each cuts a wide range of shapes and metals a little faster and a good deal cheaper than the so-called "all purpose" blade; but to reduce cutting costs to the minimum — use the Starrett Hack Saw Chart *with* the Starrett Blades.

A copy of the Starrett Hack Saw Chart sent free. Also Catalog No. 213 showing 2100 kinds and sizes of fine precision tools and hack saws.

THE L. S. STARRETT CO.

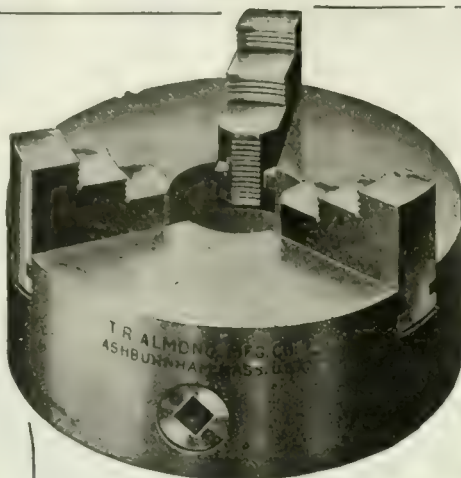
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Manufacturers of Hack Saws Unexcelled

ATHOL, MASS.

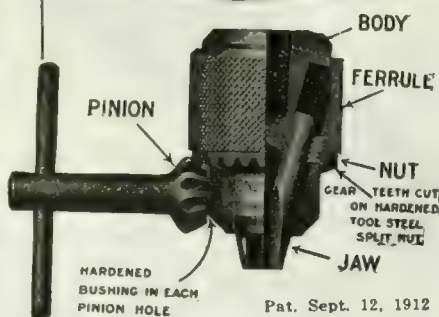


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Universal
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Sizes 5",
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and 12".



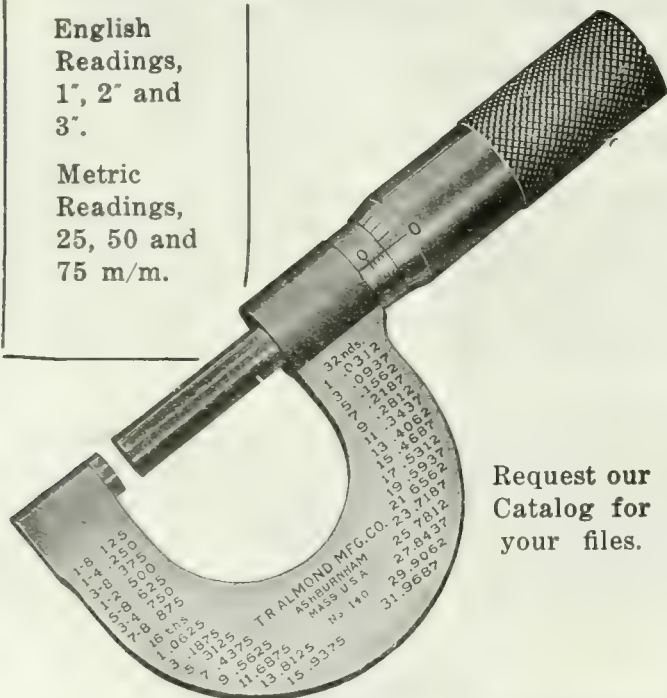
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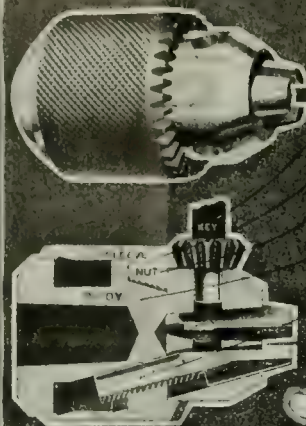
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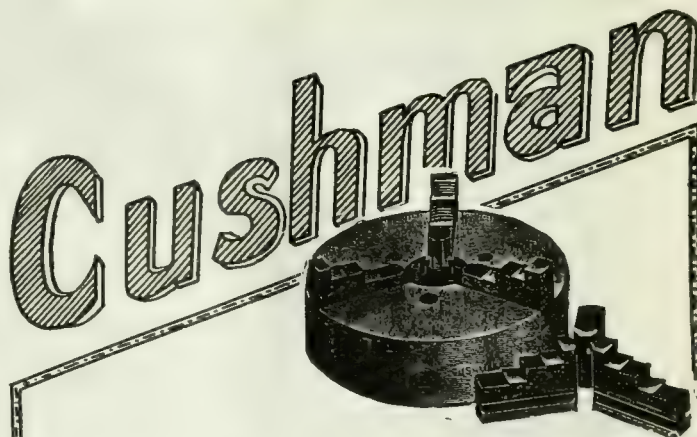
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Gripping Features

Key quickly and firmly tightens jaws.
Toothed sleeve superior to other chucks.
This nut insures accurate operation of the jaws.
Body — Durable — Sturdy — Compact.
The jaw always firmly clamps the tool accurately on center.

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And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

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Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

Cushman Chuck, Hartford, Co. Conn

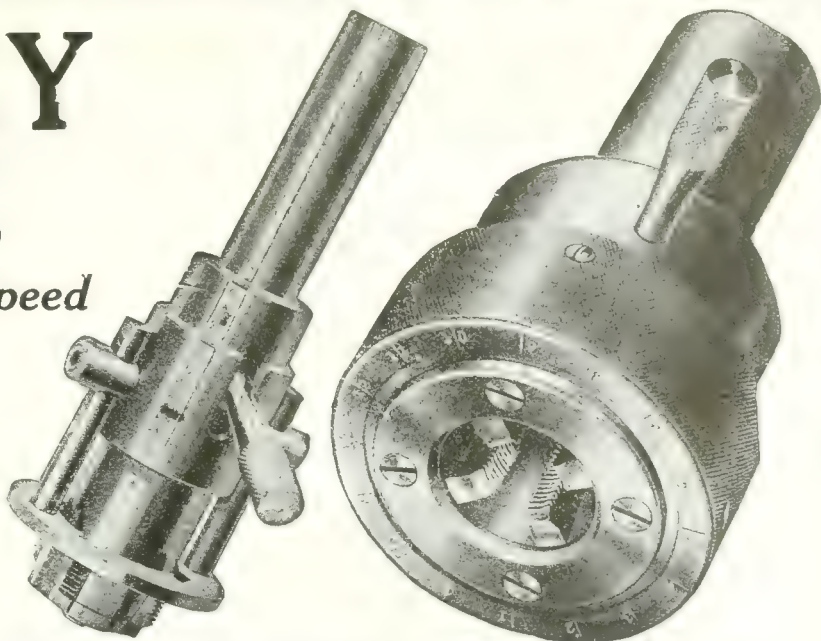
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COLLAPSING TAPS and SELF-OPENING DIES

Promote Accuracy and Speed

MURCHEY Collapsing Taps and Self-Opening Dies are cleared free from the thread instantly, preventing all danger of stripping, besides cutting time for production in half. **Thus you are sure of greater accuracy and greater production.** Murchey Tools are speeding production in all parts of the country on tapping machines, drill presses, monitor machines, boring mills, turret lathes, and all other machines to which taps or dies may be attached.



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Die Head Cuts Perfect Threads

The H. & G. Die Head illustrated is only 3 5/8" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1 1/2" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

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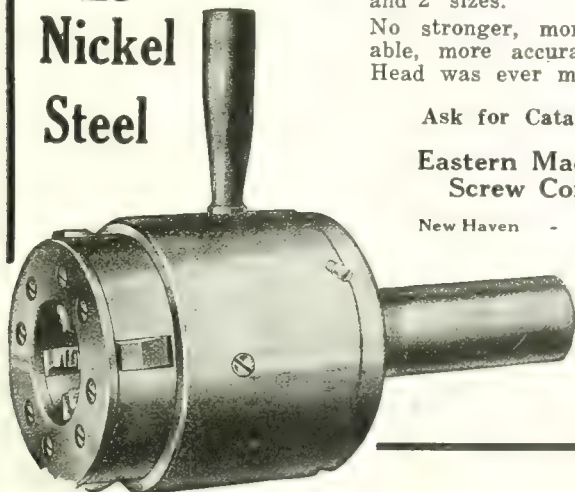
No stronger, more durable, more accurate Die Head was ever made.

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**Eastern Machine
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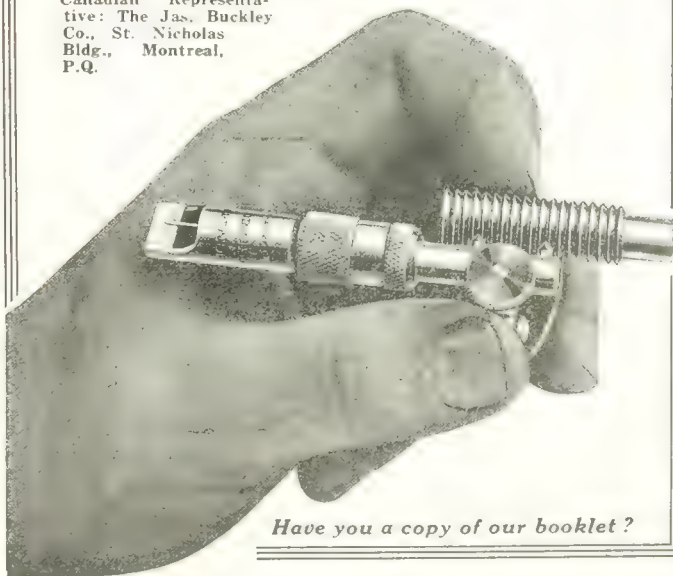
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Getting the right thread lead instantly, and maintaining a constant check upon it, minimizes the possibilities of delays in assembling and reduces the number of parts scrapped through incorrect measurements.

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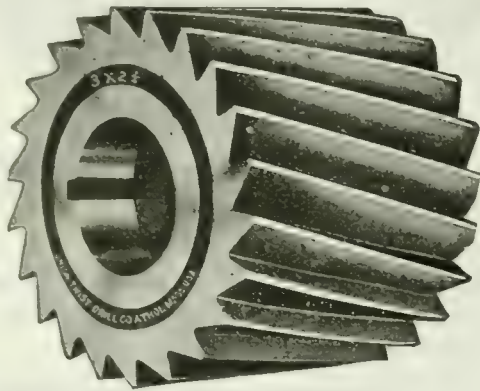


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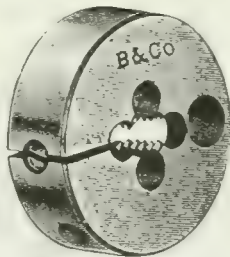


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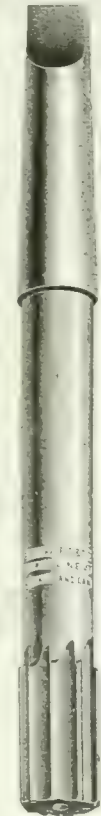
Ask for our catalogues.



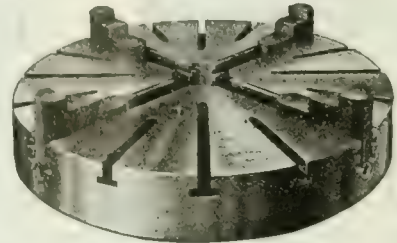
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It has an iron body, and is made heavy and strong. The double bearing ribs for the jaws make a stiffer chuck for heavy work than the ordinary single rib type.

The screws are also of the "socket" type and operate in hardened steel thrusts, which also add to the strength and stiffness of a chuck that is designed for heavy duty.

The jaws are wide and the screws are correspondingly large.

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Makers of a Complete Line of Chucks

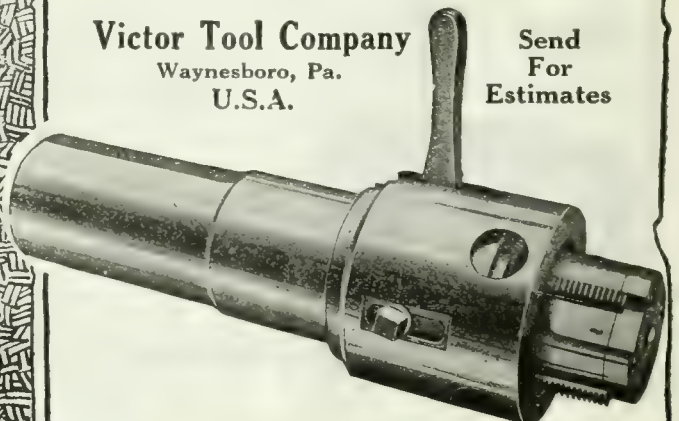
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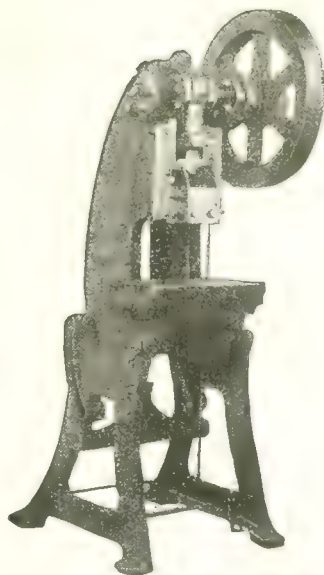
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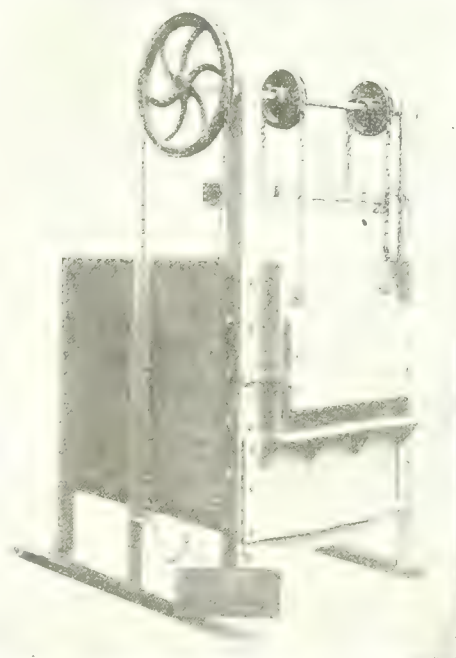
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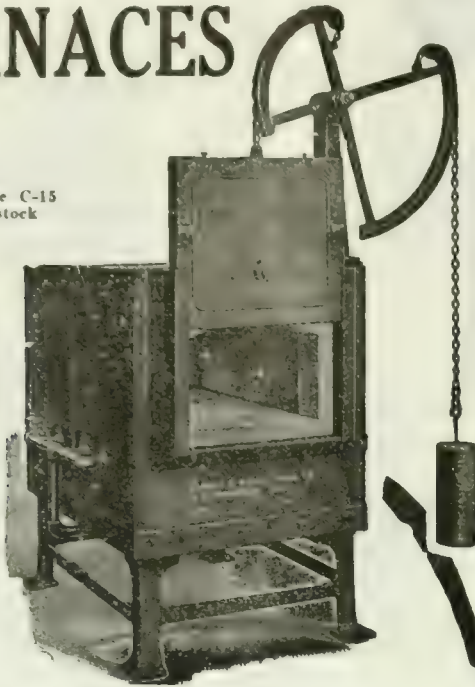
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There is a G. & B. furnace for every heat treating requirement. Tell us your problem and we will promptly tell you the type of furnace best suited to your needs, but first send for Bulletin 24. Today is a better day than tomorrow—write.

GILBERT & BARKER Manufacturing Company

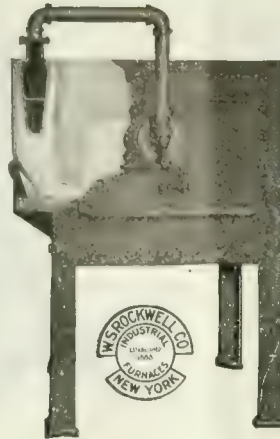
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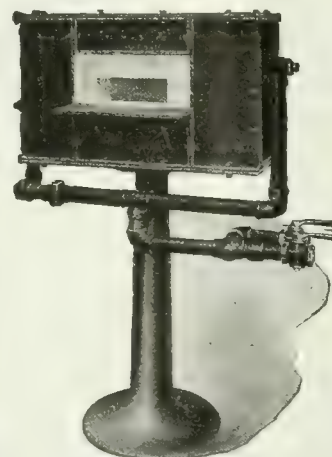
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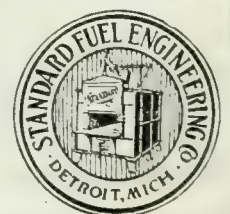
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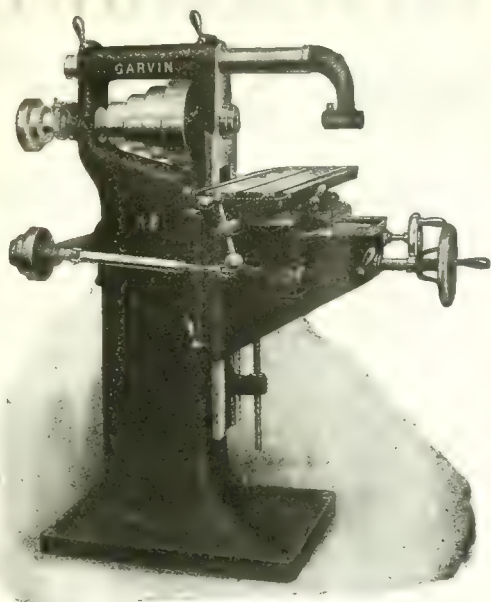
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FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rigidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments18 x 6 x 15 in.

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THE GARVIN MACHINE COMPANY

Spring and Varick Streets

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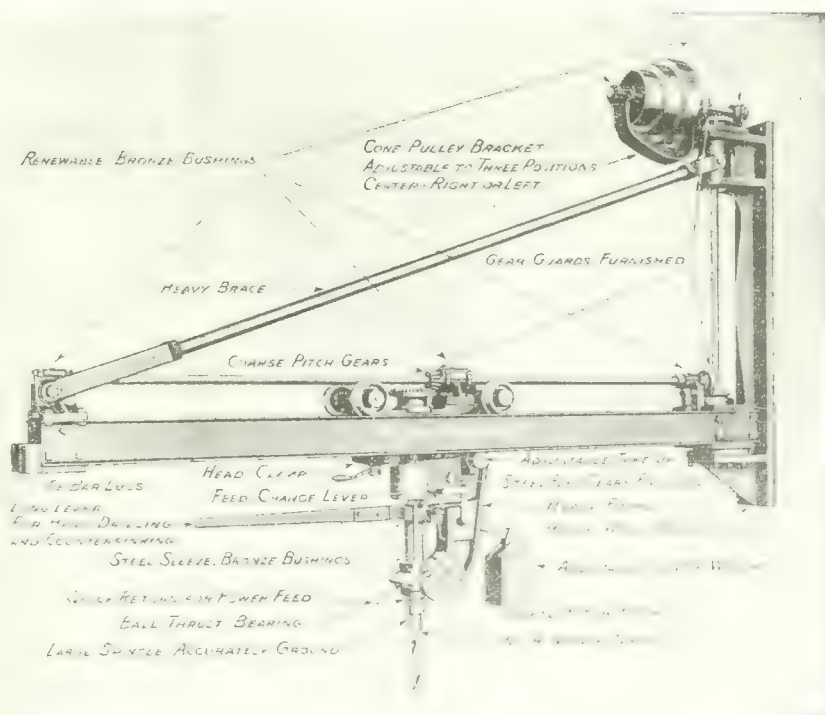
"These machines were put in operation immediately upon arrival, have been producing ten hours per day every day since, and we have never experienced a bit of trouble with same." We know you will appreciate what this means in any shop, and believe this is the sort of machine you are looking for. We consider the machine the finest in its line on the market to-day, and believe an installation would save money for you in the cost of your production.

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Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to $\frac{1}{2}$ " thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

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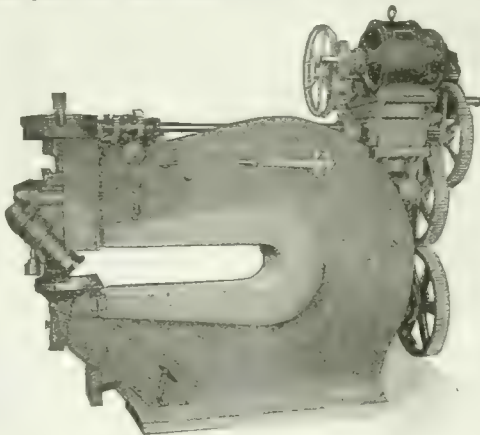
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"QUICKWORK"
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Made in 6 Sizes

Cut all gauges of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building ships, boilers, tanks, cars and general plate and sheet metal work.



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Eliminates Oxyacetylene Cutting and Plate Planing

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Perfect Riveting

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Boys on Grant Riveters accomplish two and three times as much perfect riveting as an equal number of men using ordinary machines.

With the

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ROTARY
VIBRATING RIVETER

rivets placed close up to the shoulder of the work are as rapidly spun perfectly smooth as are rivets in easy-to-reach spots.

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Without Chat-
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Stand Up
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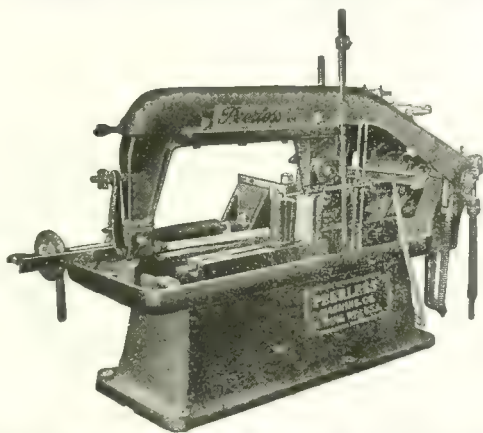
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Peerless **HIGH
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**Has Proven Its Efficiency
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DON'T turn down the "Peerless" because you have tried out other hack saws which did not answer your requirements.

Many concerns who were persuaded only with the greatest difficulty to try their first "Peerless," because they "just knew it would turn out like the others," are to-day among the largest and best-satisfied users of our High-Speed Saws.

The "Peerless" is different—and better. It does 50 to 100 per cent. more work, cuts with thinner saws and requires a minimum of attendance, saving time, labor, material, blades and floor space. What is your work? We can tell whether the "Peerless" will do it, and back our judgment with a 30-day trial. If it doesn't make good we pay freight both ways. Well?

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Has extra fasteners on sleeves and trouser legs permitting their being tightly fastened around wrist and ankles. No gaping garments to catch in machinery.

Designed for service, comfort and protection, outwears regular overalls, extremely strong, comparatively light weight.

An exceptional garment at a reasonable price.

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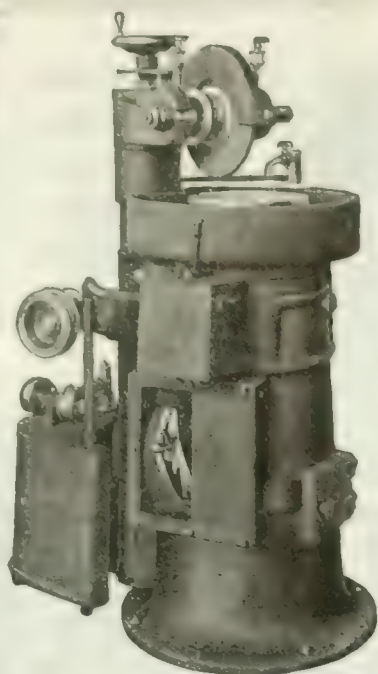
Easiest to put on and take off.

The Strong, Kennard & Nutt Co.

Safety and First Aid Equipment
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BRISTOL

Bristol 12-inch Rotary Precision Surface Grinder

Built for rapid production on grinding work.

It handles work either singly or in multiples within the capacity of the chuck and not thicker than 6-in., and grinds within quarter thousand in. of manufacturing accuracy.

And it is built to last.

It is provided with exceptionally long bearings throughout, especially in the back column. This prevents the wear, which is very slight, from affecting the accuracy of the grinder. The Back Column is made to swivel four degrees, which allows concave or convex grinding.

Bristol Rotary Surface Grinders are made in several types and sizes and are regularly equipped with 8-in., 12-in., and 16-in. magnetic chucks, either belt or motor driven and for dry or wet grinding.

Our Bulletin describes the many good points fully. Send us your name and address and we'll gladly mail you one.

Grinds within .0004 in. of absolute Accuracy

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SUCCESSORS TO C. G. GARRIGUS MACH. CO.
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Dunbar Springs are thoroughly tested for accuracy and quality. Send us specifications, for estimates.

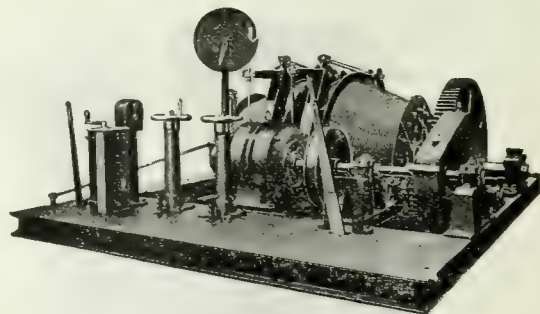
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Precision in threading can be attained only by the use of precision tools.

The "Gun" Tap

The "Gun" Tap holds all records for accuracy, speed and durability. Its shearing cut requires a minimum of driving power and is self-cleaning—it shoots the chips ahead.

The "Gun" Tap maintains its size and lead in any material.

The Acorn Die

The Acorn Die is capable of a minute adjustment, holds its lead with accuracy, is absolutely rigid while cutting and will outwear a number of ordinary dies.

Nicely illustrated booklets describing the "Gun" Tap and the Acorn Die will be sent on request. Also new No. 40 Small Tools Catalog.

Wells Brothers Company
of Canada Limited
GALT, CANADA

Canadian factory of the
Greenfield Tap and Die Corporation



Note On Grinding

No. 63A

Automatic vs. Hand Feeding

A great many operators are indifferent about the method of feeding the wheel into the work, and this attitude brings varying results in the finish ground product. There is entirely too much tendency on the part of those operating grinding machines to use a hand feed in bringing the wheel in. This results in irregular feeding and calls for undue service from the wheel.

In previous articles it has been pointed out that the relation of wheel speed to work speed and the amount of feed are responsible entirely for the degree of efficiency with which that wheel operates. If this hand feeding, which varies from time to time, is persisted in, naturally the wheel, under certain conditions will not act efficiently. Those conditions arise when the wheel is fed too deeply into the work for the grain and grade and speeds used.

All good grinding machines are provided with automatic feeds and these automatic feeds are so arranged as to regulate the amount of feed that the wheel advances with each revolution of the work, or each stroke of the table, there being different kinds of feeds which carry either at each end of the stroke of the table or at each revolution of the work. These predetermined and regular advancements of the wheel allow such a wheel to act under its normal and effective conditions, resulting in a greater output, longer life of wheel and increased quality of product.

Many times chatter marks can be traced to hand feeding. The operator may be pressed for large production and brings his wheel in rapidly, in order that he may perform with his hands other operations, such as dogging the work. This allows the wheel to fill with steel and cut irregularly on the face. When the cut is allowed to die out, chatter marks, mottles, or blemishes in the work are produced.

Production is also affected by these conditions. It is universally true that where the automatic feed is adhered to religiously, production is at its highest point and quality is always the best.

Alundum wheels of the vitrified process are recommended for the internal grinding of hard and soft steel.

NORTON COMPANY

Canadian Agents—The Canadian Furber-Morse Co., Ltd., Montreal,
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Grinding Wheel Plants, Worcester, Mass.



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DIAMOND TOOLS FOR TRUEING GRINDING WHEELS



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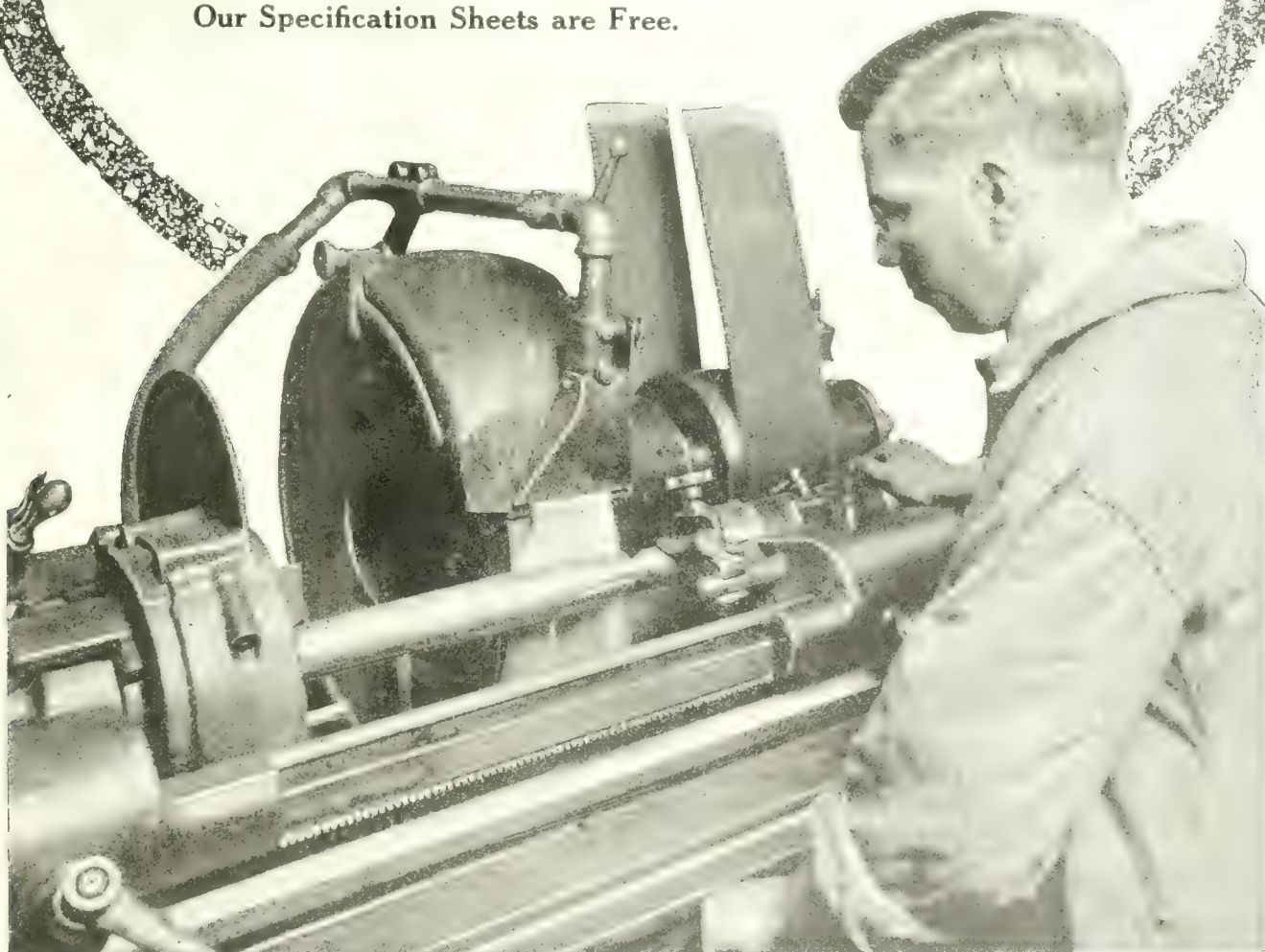
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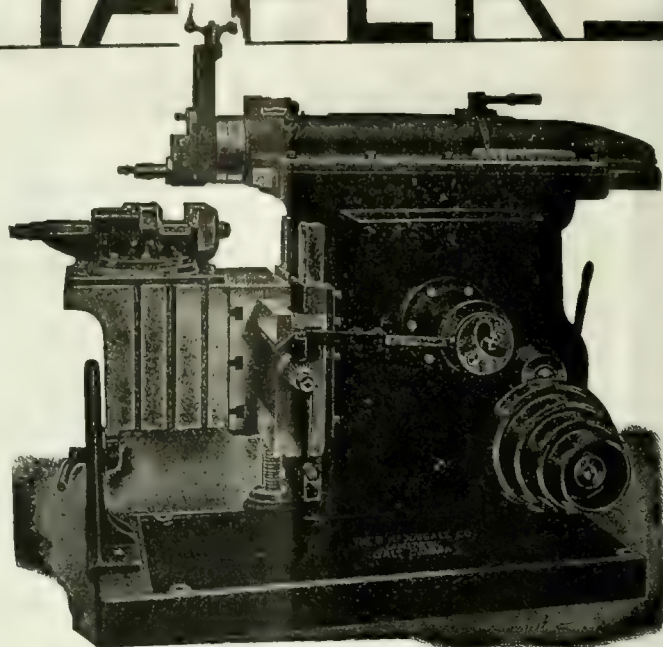
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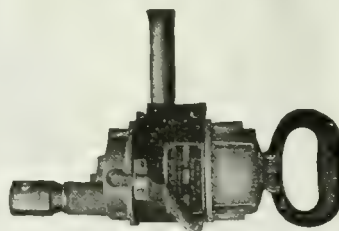
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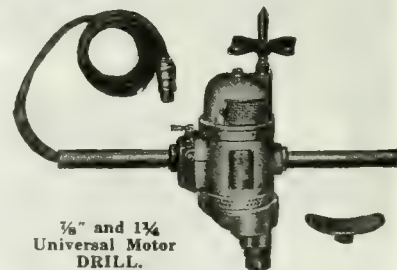
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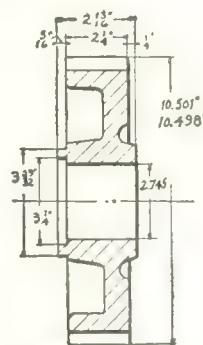
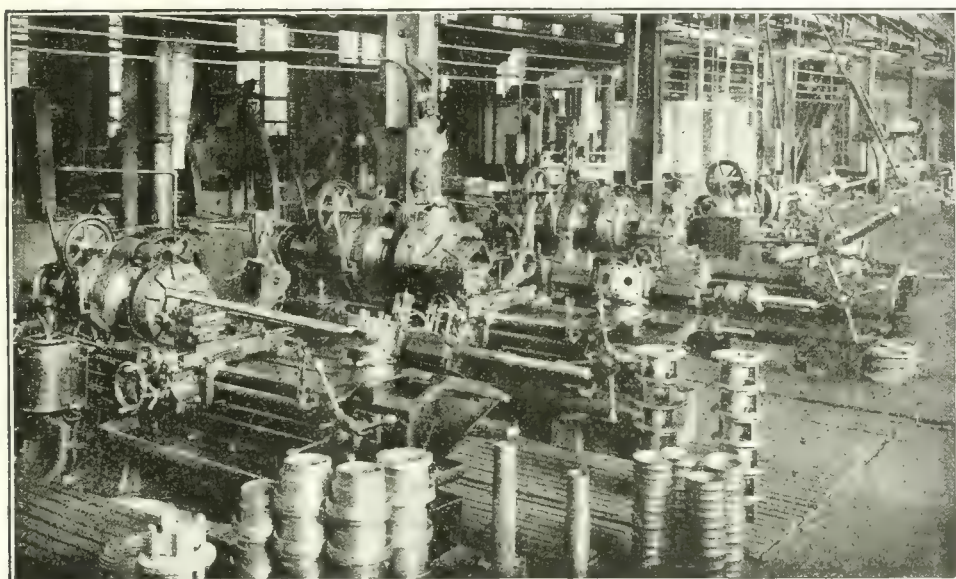
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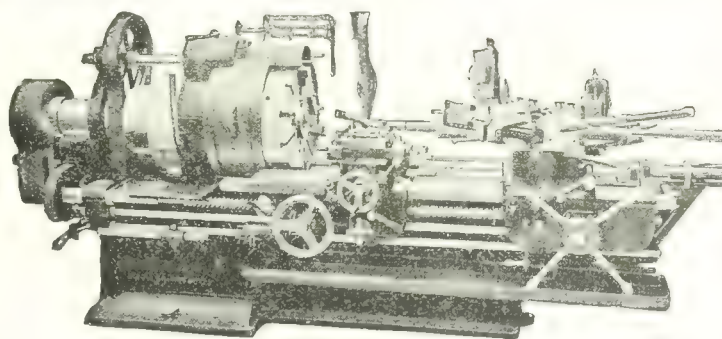
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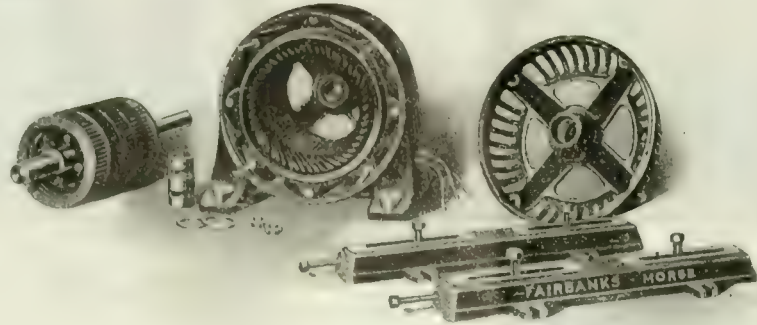
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CANADIAN MACHINERY AND MANUFACTURING NEWS

Volume XXII. No. 4

Toronto, July 24, 1911

Building 5-inch Gun Mounts at Brantford

Close Limits Were Absolutely Essential on This Work—First-Class Tool Equipment, Together With Special Machines and Fixtures, Made Such a Condition Possible—This Article Will Appear in Two Parts

By J. H. MOORE, Associate Editor Canadian Machinery

HOW many readers of CANADIAN MACHINERY know that for the past 2 or 3 years, right up in Brantford, Ontario, a large, up to the minute machine tool plant has been turning out 5-in. Naval Gun Mounts for Uncle Sam's Navy? Not many, I'll warrant, and yet such is the case.

To confine the main information to its briefest form, let us just state at the commencement of this article that the firm spoken of is the Dominion Steel Products Company, of Brantford, and the work and its procedure of manufacture, reflects great credit to the above firm for the way the product is being handled.

The machine tool equipment in this plant is a positive treat, and if the writer does not enter into each particular tool throughout the plant, it is not from lack of enthusiasm, but rather through lack of space in an article of this nature. He will, however, try, in as far as possible, to give readers a good idea of the general main operations, and method of manufacturing this gun mount, so asking readers to remember that this article's subject to check from the U. S. authorities, therefore all definite dimensions or detailed drawings and sketches are omitted.

We will now go on to the article itself, and to form a good idea of what we propose following up let us look at Fig. 1, which shows a mount practically completed.

This view is shown with a two-fold purpose, first to bring to the reader's eye a general assembled view of the product about to be discussed, and second, to explain points on the photograph. We will not however touch on these points for the present, but ask the readers to simply study the photo for a general idea only, and to remember that the portion marked A is called the stand, the portion B the carriage, and the portion C the slide.

These three portions are the main castings on this product, so now since readers are no doubt familiar with its general appearance we will pass on to the portion A, the stand, and follow up its operations.

The first few operations are completed on Bertram vertical boring mills, the first of these operations being facing off the bottom. The next operation in sequence is illustrated at Fig. 2.

This operation consists of boring and turning to the various diameters, double heads being used as can be seen from the photograph. In the next operation a bronze ring is shrunk on the portion

spent on the operation, etc., etc., will not be amiss. First the piece itself is made of cast steel. The machine used is a gear cutting machine, made by the Jones Superior Co., of Chicago, Ill. There are 135 teeth in this circle of 1 in. circular pitch. The work is cut with a Brown and Sharpe hob running at 76 in. per minute. Lard oil is used as a lubricant, and the time spent in cutting one of these circles is only 5 hrs., which is splendid time as readers will no doubt agree. The work comes to this machine direct from the lathe. The contour of the worm is machined out, but otherwise no previous gear cutting work has been done on this piece. Of course readers can understand that the circle turns slowly around as the hob revolves, the teeth being cut deeper each revolution.

The Carriage

We will now pass on to the carriage, and its various stages of manufacture. The very first stage is the laying out process. In fact this laying out operation is the first stage of operation on all the larger castings, including the stand we have already described. First the casting is painted with a whitening compound as shown at Fig. 3, when the various lines, centre punch marks, etc., are laid out. In this photo you will note the heavy angle plate, used in conjunction with large hand marker. The workman simply gets the angle plate in proper position on the layout table, places the marker against the face of the angle plate, and drawing it down the plate, describes with the point of the marker whatever line he desires. In the case shown on the photograph he is drawing in the line designating the centre of the carriage. To watch this fellow at work is a treat, for he has become so accustomed to his work, that what to the average workmen would be a painstaking and arduous task, is to him

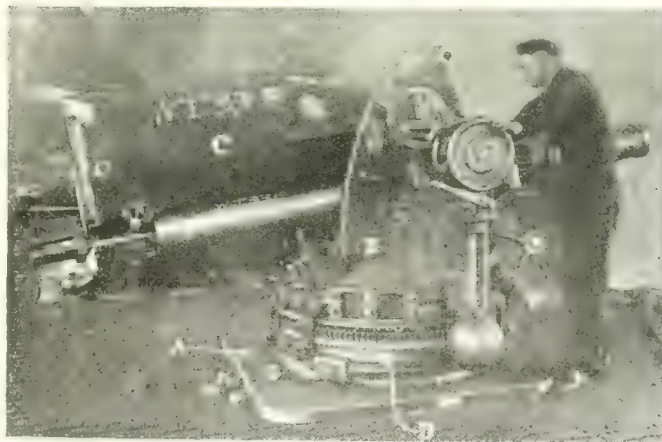


FIG. 1.—GENERAL VIEW OF THE MOUNT.

A, and turned to size right in place on the mill. The other remaining operations are the standard style of milling and drilling, so no further mention of these is made, except to say that before completion, the roller race seat is scraped in carefully to allow the same to run correctly.

The Training Circle

In Fig. 7, we show the operator at work cutting the training circle already spoken of. This is a very important and interesting operation, and some particulars as to the style of machine tool used, the time

a mere matter of routine work. Readers will note the huge surface gauge used on this work, and the proportion of the workman to the casting of the carriage, will

taken direct to the boring mills, which start the first actual machining operation. Two 7-ft. Bertram Vertical Boring Mills handle these carriages, and they are

have some rough drilling operations performed on them, but as this is standard work, no special mention of these operations is made.

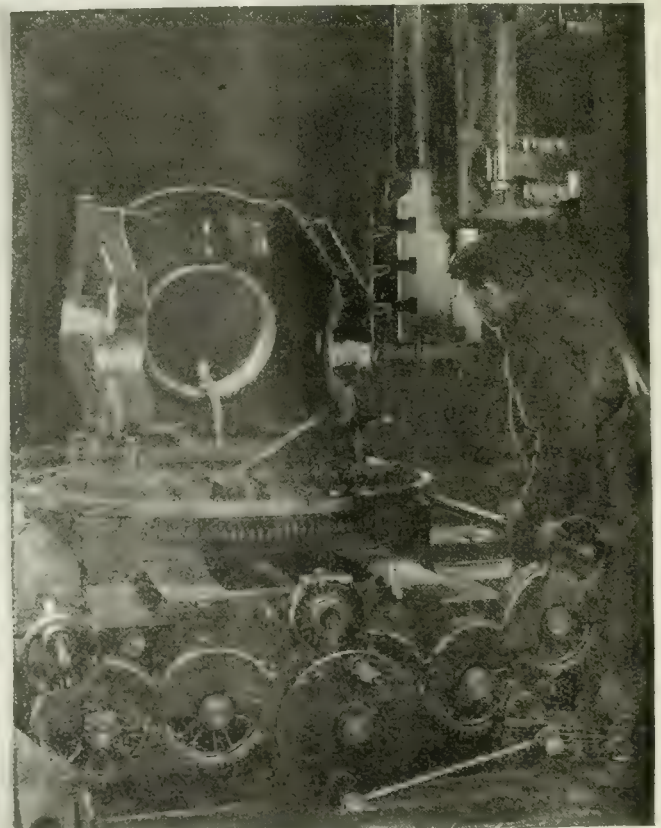
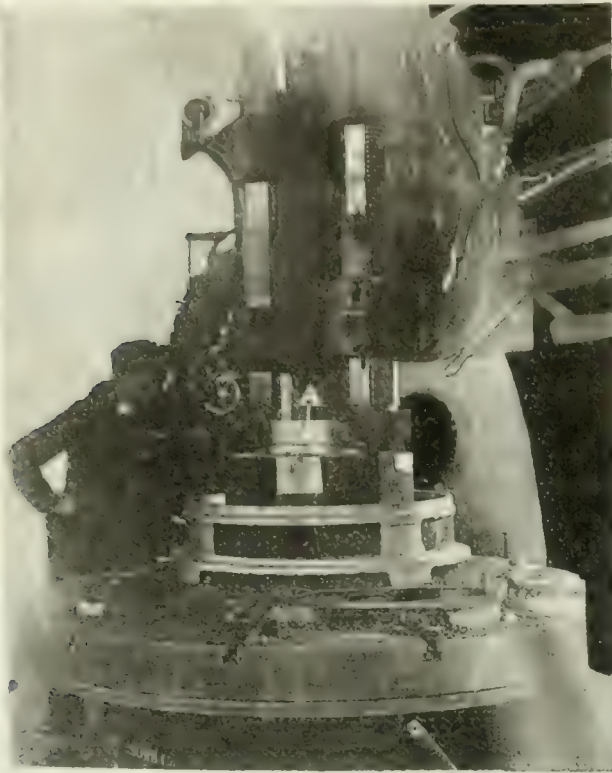


FIG. 2.—BORING AND TURNING THE STAND.
FIG. 4. FACING THE TRUNNION BEARINGS.

FIG. 3.—LAYING OFF THE CARRIAGE.
FIG. 5.—SLOTING OPERATION ON THE CARRIAGE.

give some idea of its relative size.

Immediately the carriage is laid out, it is picked up on an electric crane, and

placed in a large special designed jig for the purpose.

They next go to the radial drill, and

They are now moved to a huge 24-in. C. M. C. slotter such as shown at Fig. 5, where various operations are performed

as follows. The sides of the trunnion bearings are machined as shown on the photo, and also the bearings are slotted out to suit the caps for same. The portion marked A on Fig. 3 is also machined on this slotter, the gearing mechanism shown on Fig. 5 allowing for the turning of the slotter table at the proper speed to make a complete circle at the proper relative speed to the ram and cutting tool of the slotter. The time taken on these operations varies with amount of stock to be removed so no mention of actual operation time is given.

The doors B (see Fig. 3 once more) are also milled, for these must be absolutely water tight when the door covers go on.

The carriage is now moved to a battery of five 6 ft. x 6 ft. Landis horizontal boring mills.

Various operations are performed on these machines, but as we cannot enter into too much detail without occupying an enormous amount of space, we take up only one operation on these machines, namely the boring of the trunnion bearings after the caps have been placed in position, also the facing of these caps and bearings.

The boring of the trunnion bearing holes is of course done with the usual boring tool and bar, while the facing is done by means of two heads shown in Fig. 4. The operation is self-explanatory for the average machinist knows how such a style of facing head works. A very notable feature about these machines is this: that each machine is kept in perfect condition, in fact the same may

after which it goes to a huge planer, and various operations are performed, but as these are of the usual nature we pass on to the actual boring operations.

The slide is now moved to a specially adapted Le Blond Lathe, and the centre hole is rough bored. After this preliminary operation it is moved to the machine shown at Fig. 6. This was built by the Conradson Machine Co., of Green Bay, Wis., and detailed attention to its construction is well worth while. The machine consists of three independent drives, namely the main spindle, and the two side spindles, one of which is clearly shown at A. It will be noticed that two independent motors drive these side spindles. Briefly the action of operation is as follows: The main spindle finish bores the centre hole, which receives the gun barrel, while the two side spindles with the aid of special turning heads B, turn the two trunnions, as can be clearly seen from the photo. It can be noticed that the complete slide is enclosed in a special jig for the purpose, in fact it is the splendid system of jigging as adopted by this concern that makes the turning out of this product such a success.

Two bronze bushes are now pressed into this finished bore, a long, and a short one, the former being towards the outside portion of the slide when assembled. These bushes are of course machined in other operations, but again we do not touch on these points simply because the work is of the usual style, and therefore of no special interest to the reader. After these bushings are in place, they are finished

attention to the parts marked A and B on this photo. At these points can be fastened a connecting rod, which pulls the saddle up and down at the proper speed to groove the bush for oiling purposes.

This idea cannot be as clearly illustrated as could be desired, but readers by following the description can see how the scheme works out. In the direct centre line, (not seen on photo) but about the position A is a crank, with T slot cut across its face. The action is now perhaps self-explanatory to many readers who have run shapers at some time or other, for the action of the stroke is similar. By connecting the rod between the permanent bolt B, and the sliding bolt on this disc A, the stroke can be altered to suit requirements. The worm shown at C is connected to a worm wheel, and the rate is such as to give the desired spiral twist to the grooving. This idea is adopted at various points throughout the plant, not always by means of worm and worm wheel, but in some cases by compounding trains of spur gears.

Special Profiling Machine

We will now refer the reader back to Fig. 9 for a definite purpose, namely to call his attention to the portion of slide marked D. This operation is known as the knife edge bearing support, and is a very important operation, as the bearing which goes into this seat takes the complete weight of the gun. For the present let us content ourselves by studying its general shape and appearance.

To machine this portion a special por-

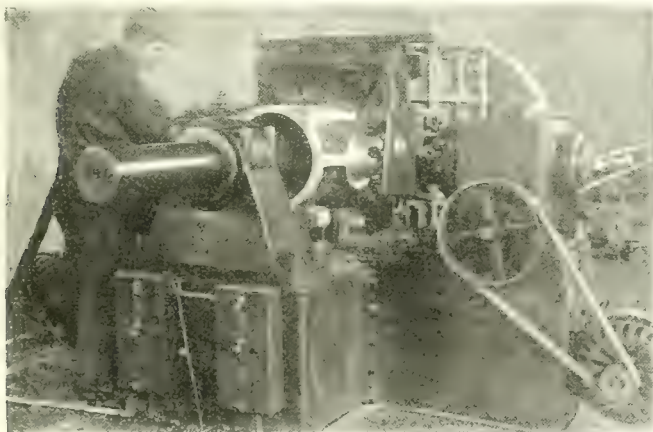


FIG. 6 BORING CENTRE HOLE AND TURNING TRUNNIONS.

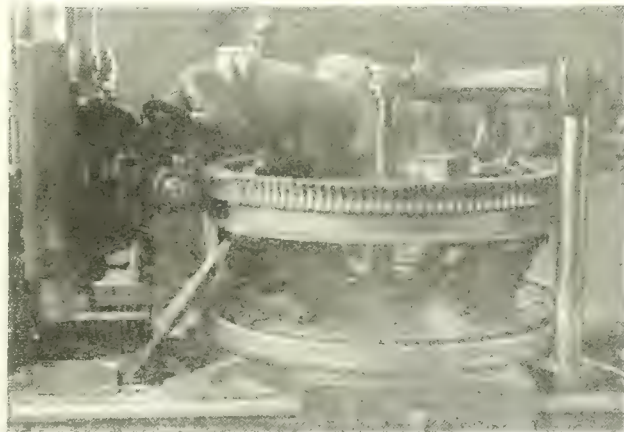


FIG. 7 CUTTING THE TRAINING CIRCLE

be said of every machine in this plant, for the tolerances allowed in the various operations are so small that it is an absolute necessity that all machines be kept in the pink of condition. Another feature on these mills is that each mill has been specially fitted with a vernier attachment, which guarantees the working to very close limits with perfect safety. This vernier scale is attached to the cross feed of the machine.

There are, of course, other operations on these carriages before its completion, but we have touched on the principal ones to give readers a fair idea of the work involved.

The Slide

This piece is of course laid out first,

bored right in position in the slide. To do this they are placed in a special jig, and bored in a lathe as shown at Fig. 9.

It will be noticed that this jig is so constructed that the work is supported directly from the trunnion bearings which have already been turned. In fact to be exact, various other operations have ensued before this operation takes place, but we show it now for convenience, besides, we wish to refer to this view a little later as readers will discover later on in the article. But to continue on the finish boring of these bushes. The style of boring head as employed can be plainly noted, so no further comment on this point is necessary.

We would like however to call readers'

table profiler was made as shown at Fig. 8. This machine in itself is worthy of special attention. First, the slide itself rests on a special jig plate. The portable combination table and head is now placed directly over the trunnion bearing. This table has a hole in it the correct size to accomplish this object. Of course, the idea is now clear as the machine is now ready for work. First the portion to be machined is milled to width, then to length. It is now faced to height, and a radius milled on the sides. The portion of slot cut into the trunnion is now machined. Of course, as can be seen, an independent self-contained motor drives the machine. This idea goes to show just what can be done by the making



FIG. 9—BORING THE BRONZE BUSH.

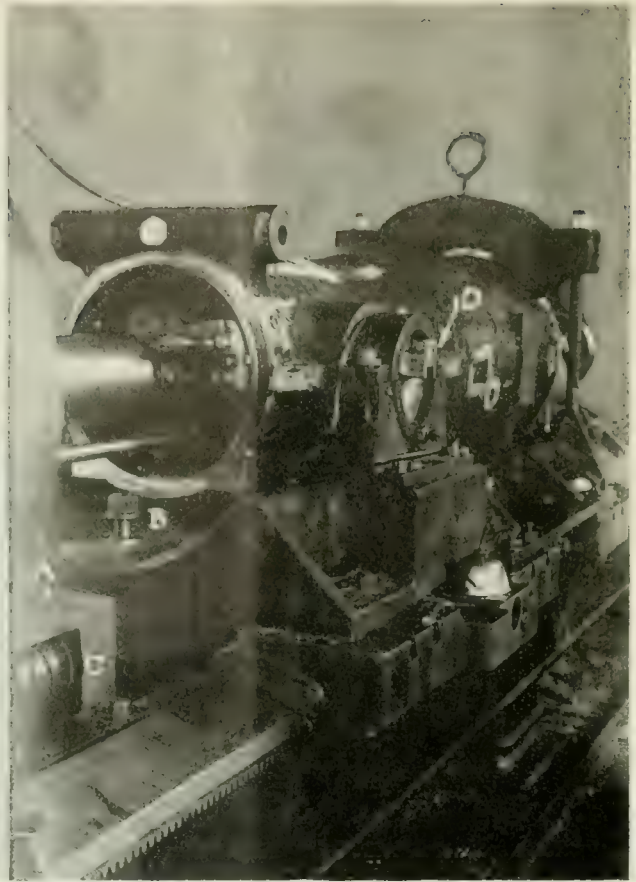


FIG. 8—PROFILING THE KNIFE EDGE BEARING.

of special machinery for a special purpose.

Slide Operations

We cannot attempt to speak of all slide operations, but we shall show one more, namely the boring of the recoil cylinder. In this operation the clearance of the recoil spring cylinders is machined. The method of machining is the usual boring bar and tool equipment, the reason for the photograph, being to show the construction of the jig. On this page are three bushings on each and to guide the boring bar, the centre one now in operation being the recoil cylinder hole, the other two (one on each side) being the guide holes for bar, when the clearance for the recoil spring cylinder is being machined. Throughout the description of these operations we have not strictly adhered to the regular sequence of operations, but we have tried to speak of them in the easiest manner to be followed by the reader, as after all this style will no doubt appeal more to the general reader. Owing to the extreme length of this article we have divided it into two parts, and at this point we will drop the article for the present, but will start next issue from the point where we left off, and will continue until the completion of these mounts ready for shipment, together with other various operations involved.

Telford and Macadam, both English engineers, introduced certain principles of road-building in 1800 which are, to a great extent, the basis of modern construction.

COPRA INDUSTRY

By L. P.

IT IS the irony of fate that, while the Occident is on short commons of oils and all fat products, the Orient has a plentiful supply, of which it cannot dispose advantageously. In British Malaya, for example, the lack of shipping has militated against the copra industry.

Mr. L. Lewton-Brain, Director of Agriculture, Federated Malay States, in his annual report states that shipping difficulties caused the local price of copra to remain very low throughout 1917, and both estates and small holdings have suffered considerably. One result has been that a large number of coconut trees, particularly in the State of Perak, were cut out, and an enactment had to be passed to prevent a recurrence of this, except in special conditions. The price of nuts remained fairly high in the inland markets, but very low in the coast districts.

Another result has been that a discussion has arisen on the possibility of the extension of the local oil-expressing industry. So far no definite scheme has been put forward, though, as all coconut estates are keenly interested, it is to be expected that some scheme will be evolved before the expiry of the current year.

Upon reference to the summary of the foreign imports and exports of the Straits Settlements and British Malaya for 1917, we find that the total export

of copra last year from the Malay Peninsula is given at 77,900 tons, against 73,236 tons in the previous year; but whereas the value of the 1916 export is returned as £1,407,309, the value of the larger export in 1917 is given as £1,190,314. The export of coconut oil in 1917 is given as £1,190,314. The export of coconut oil amounted to 5,891 tons in 1916, valued at £285,373.

In view of the possibility of the African oil palm coming into prominence as a plantation crop in Malaya an experiment consisting of fifteen tests has been planned by the F. M. S. Agricultural Department, in order to determine the best method of promoting more rapid germination of the seed. The palms near the agricultural offices at Kuala Lumpur showed good growth for the year. Many enquiries were received regarding the cultivation of this crop, and the required information was given by the Department.

Frequently when visitors are invited to a factory restaurant for lunch there is some embarrassment caused when the check is issued.

This is avoided at the Ferro Machine Company by issuing complimentary lunch tickets to visitors. These are taken up by the cashier and charged to the company.

Not only does this system do away with embarrassment but is in accordance with the hospitality usually extended to such visitors.

The New Moffat Electric Steel Furnace

Features of Design Which Make For Economy in Operation and Refractory Endurance Are Incorporated—The Arrangement of Electrodes is Also of Interest

By W. F. SUTHERLAND

RECENT developments in the smelting of iron ores by a duplex process employing the electric furnace as the final step for the melting of sponge were described in the April 3 issue of CANADIAN MACHINERY by J. W. Moffat. While the electric furnace which will be used in this duplex process may be of any type, it is of interest to note that Mr. Moffat has developed a design for the refining of steel which is capable of very economical operation.

In some respects this electric furnace resembles the three-phase types now in common use, the three electrodes projecting into the bath from above. Usually in such furnaces, however, the refractory lining of the walls and the shell are circular in shape, and the electrodes are arranged one at each angle of an equilateral triangle equidistant from the walls.

In the operation of such furnaces trouble is frequently encountered by reason of the crescent-shaped masses of partially fused raw material found clinging to the walls between the electrodes, this material being thickest at the point midway between any two electrodes. These masses are often difficult to get into the bath, as in their partially fused state they adhere to the colder wall of the furnace. In endeavoring to remove them by mechanical means, injury is often done to the lining of the furnace, portions being carried away and into the bath.

The more usual practice is to increase the input of electrical energy and to melt off the partially fused material. This procedure, however, increases the length of time for the manufacturing of the steel, often as much as one-half hour in a heat which should be taken off in about four hours, and means an increased cost amounting to 12 to 15%. The practice is also objectionable, as it leads to overheating the already fused material in the bath, and also to the overheating of the furnace walls nearest the electrodes.

New Design

In the design developed by Mr. Moffat, for which patents have been recently issued, these difficulties in operation have been overcome by shaping the body to conform to the lines of current flow in the bath of molten metal. The characteristics of current flow in a flat plate or an approximation thereto are well known, and the current is distributed throughout the metal, the lines of equal current density being in the form of current arcs from pole to pole.

The shape of the walls is well illustrated in the accompanying diagrams, and it will be seen that the walls are brought inward between electrodes in such a fashion that no cold spot occurs, and the growth of partially fused nodules of metal avoided. In other words, the furnace walls are so shaped as to conform to the isothermal lines of temperature in the furnace.

It is also found that to secure the best results in wall life, that the wall itself should be of equal thickness at all points in any horizontal plane, and by so arranging it, the radiation is the same at all points, thus rendering it impossible for any one point of the inner lining to be-

come heated to a higher temperature than other parts of the same wall. In this way the overheating of portions of the wall is avoided, and one of the most fruitful causes of short refractory life avoided.

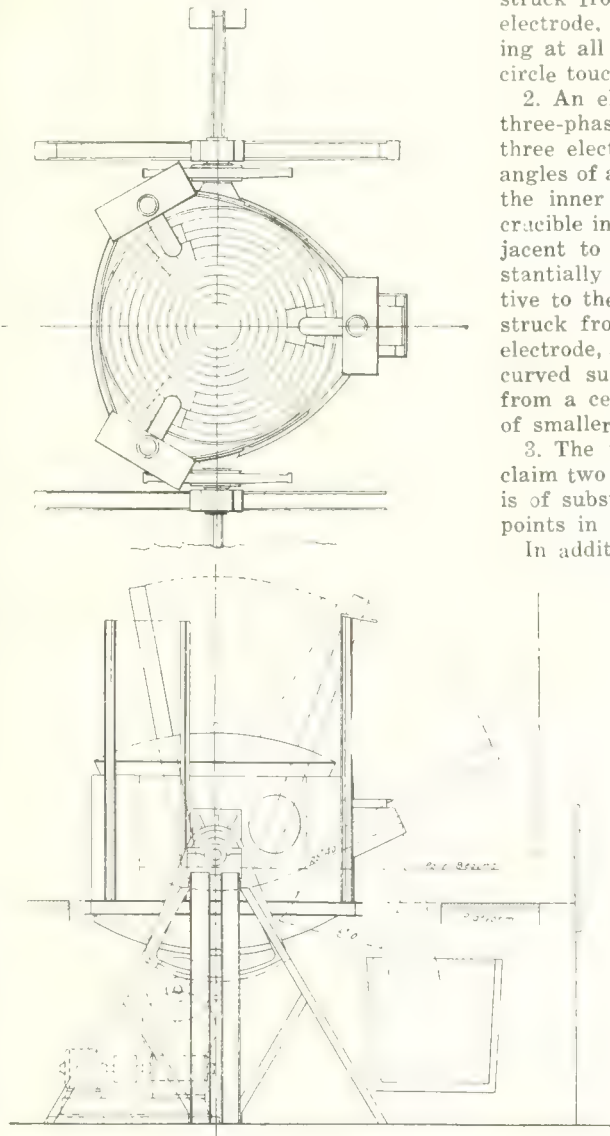
The claims made for this furnace in the patent specifications, are of interest, and are given below.

1. An electric furnace, operating with three-phase current, and provided with three electrodes arranged in plan at the angles of an equilateral triangle, in which the inner surface of the wall of the crucible in plan is shaped as follows: Adjacent to each electrode curved substantially on an arc of small radius relative to the spacing of the electrodes and struck from a centre in the axis of the electrode, and between the electrodes lying at all points within a circumscribing circle touching each of the arcs.

2. An electric furnace, operating with three-phase current and provided with three electrodes arranged in plan at the angles of an equilateral triangle, in which the inner surface of the wall of the crucible in plan is shaped as follows: Adjacent to each electrode curved substantially on an arc of small radius relative to the spacing of the electrodes and struck from a centre in the axis of the electrode, and between any two electrodes curved substantially on an arc struck from a centre adjacent the opposite arc of smaller radius.

3. The third claim is a repetition of claim two with the addition that the wall is of substantially equal thickness at all points in any horizontal plane.

In addition to the above operating advantages, the shape lends itself to the securing of a number of other important advantages. The lining is built up entirely of key and wedge bricks. This results in their being held rigidly in place relative to one another, and they are, in consequence, unable to work inwards to the open space of the bath. The bottom is an inverted arch formed with an outer lining of arch brick, silica or fire-brick, and an inner lining of magnesite key brick on top of which may be placed another course like that last, or a burnt-in bottom of grain magnesite may be used of equal thickness.



PLAN AND ELEVATION SHOWING GENERAL ARRANGEMENT.

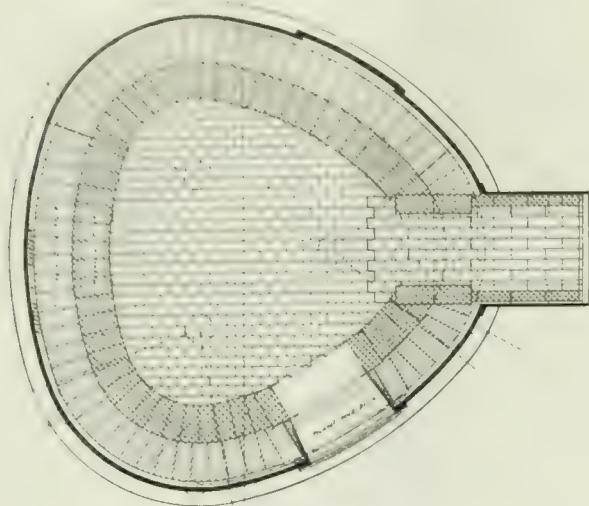
If the operator in taking a heat is careless and not watching his slag, there is no fear of a run-out caused by a brick floating up, as they are all keyed.

The Roof

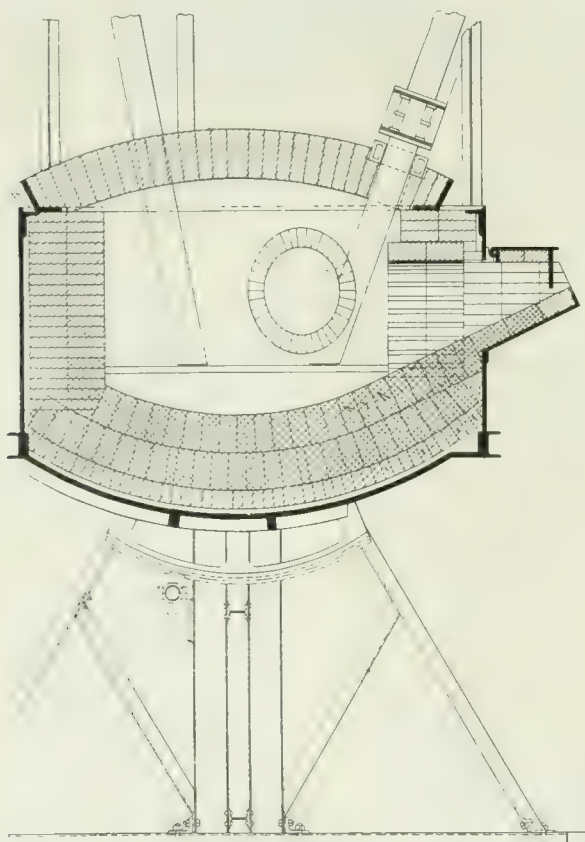
When the furnace requires a new roof

at an angle of 70°, and are fastened to the roof cooling casting inserted in a gain made in the roof brick around the electrode opening. These guides are hinged at the top of the uprights.

When a new roof is to be placed in position two bolts are loosened, and after



SECTIONAL PLAN SHOWING SHAPE AND METHOD OF LAYING UP LINING.



CROSS-SECTION SHOWING SHAPE AND METHOD OF LAYING UP LINING.

it can readily be placed in position with the aid of a crane in about one-half hour, owing to the convenient arrangement of the electrode guides.

On each electrode two upright guides are spaced equidistant from the electrode opening in the roof. At the top of these uprights the guides pass downward

the electrode has been raised to clear the roof all that is required is to lift the roof cooling casting about two inches, enough to clear the gain in the roof, and the whole assembly can be swung out of the way of the old roof being taken off and the new one being placed in position.

SCIENTIFIC RESEARCH

The Special Committee on Scientific Research deserves and requires generous encouragement and financial support from the Government. Under the sanction of the Research Council Act of 1917, and by means of the Honorary Advisory Council for scientific and industrial research a survey of the field has been made. Time has come when further steps must be taken and additional financial support be available if Canada is to keep pace and make a proper use of its assets.

We have no institution corresponding to the Bureau of Standards at Washington, so are dependent on U. S. and other countries for information and guidance in matters which vitally concern her industries. The committee recommends the establishment of a Dominion Bureau of Standards. Concerted and continued efforts should be made to place before the people the facts concerning scientific research and the advantages of national support thereof. The committee does not feel they have had sufficient time to digest evidence and so forth to make definite suggestions, and asks to be reappointed as early as possible next session to give the matter further consideration. They ask that their proceedings be printed for distribution and be put in the sessional journals.

There are, for instance, 1,500 square miles of tar sands in Northern Alberta near Port McMurray in a stratum from four to ten feet thick, and the tar in the deposit ranges in concentration from ten to eighty per cent. The tar sand was used to pave a street in Edmonton, which pavement has been in satisfactory use for five or six years. The quantity of sand mixed with the tar is a handicap, as, if transported long distances, the sand would be a serious factor in the freight charges. A grant was made to determine a cheap method of separating the tar from the sand on a large scale, but, owing to the impossibility of finding scientific and specially qualified engineering experts, nothing has yet been done.

SAFEGUARDING BAR STORAGE

In storing steel bars it is quite common to stand them on end in special racks. For that matter this is one of the most economical and space-saving methods of storing. These round bars, however, unless the workers are quite careful, are apt to fall over.

To prevent this, one firm has placed a bar across the front of each rack. This can be lifted up out of the way when it is necessary to take out steel bars and then placed back in position before the worker leaves the storage rack. Perhaps some such method as this would make the bar storage safer in your plant.

British Mission to Canada.—The National Union of Manufacturers of Great Britain is proposing to send six of its most prominent members to Canada to study conditions, and obtain information relative to the furtherance of British export trade to Canada.

The Scope of the Works Laboratory

The Relations Which Should Exist Between a Works Laboratory Are Herein Ably Discussed—This Paper Formed an Interesting Subject Before the Birmingham Section of the Institution of Mechanical Engineers

By MR. BARCLAY

THE relations which should exist between a works laboratory were very ably dealt with in the paper which Mr. Barclay read before the Birmingham section some time ago. Mr. Barclay has certainly earned the gratitude of all existing and potential works chemists for the very eloquent way in which he described some of the directions in which a works laboratory could be of real practical use to industries. This paper is the result of a suggestion thrown out during the reply to a somewhat lengthy discussion, and is not therefore to be regarded as a separate dissertation, but rather as a further contribution to that discussion. It is not overstepping the mark to say that the future industrial prosperity and commercial supremacy of our whole Empire depends to a very large extent upon the application of science to industry, but nevertheless it is a somewhat appalling thought that only the shock of the most disastrous war which has ever stemmed the tide of civilization could bring home to industry the desirability of a closer union with science. Even now it is doubtful if the advantages to be gained from a proper application of science to industry are recognized to anything like the extent they should be. The view "of course it is the patriotic thing now-a-days to employ Doctors of Science and those sort of people, but when the war is over we shall be able to do without them" has been expressed. This is no doubt an extreme case, and it is exceedingly gratifying to report such a feeling does not exist in the metallurgical and engineering industries. In these industries, at least, there can be no doubt that the laboratory has come to stay. And why? Because it has proved its value. The fact that the laboratory has come to stay because it has proved its value is a most important one, which should be taken to heart not only by the captains of industry, but also by the laboratory workers. Since, therefore, there is in one section of industry an undisputed demand for trained scientific workers, it is highly desirable that the demand should be catered for as widely as possible. In this connection it is quite futile to quote as examples Germany and America, for granting the fact that a closer application of scientific principles has contributed to their rapid rise in the industrial and commercial worlds, their cases are not parallel with ours. The great Anglo-Saxon stock from which we have sprung has always been a pioneering

race with originality for its most powerful characteristic, and to graft on to that character the Teutonic attributes of copying and exploiting would be a great national disaster. Rather let us seek out some method of our own, and in its development use our natural judgment in determining the modifications which seem to be advisable in view of what has occurred in other countries. They have undoubtedly made mistakes by which we should profit, for herein lies the key of progress. Perfection is an ideal which can only be striven after; it is not within human capacity to attain it, and after all, the perfect world would probably be a poor sort of a place to live in.

The statement of the problem is very simple—on the one hand we have that most fascinating study, science, and on the other hand industry, on which our greatness as a nation depends, for after all it is the industry of a nation and not its "will to conquer" which determines its ultimate greatness; the problem is to determine how the two can be harnessed together so as to be of the maximum use to each other. We hear so much of the benefits which will accrue to industry by the application of science to it, that we are apt to overlook the fact that industry has been of incalculable help in scientific development by supplying it with many complex and fascinating problems, and the recognition of this fact by the scientific worker is of equal importance, with the recognition by the manufacturer of the benefits which his particular industry will derive through the assistance of science. Obviously the first thing to do is to provide a laboratory; not a very difficult matter in these days, when manufacturers are even prepared to co-operate in their upkeep. At the very outset it is essential to confine our attention to some particular type of laboratory, for since there are over 20 different branches of industrial chemical activity, it might be assumed that there must be essential differences between the functions of the laboratory in a fine chemical works and that in an engineering works; but a closer inquiry indicates that the differences are only in matters of detail. Differences in detail will always occur; for if they arise in no other way the human element will create them. In such an inquiry as this we can only consider general principles and leave details to look after themselves; far too many promising schemes are nipped in the bud by a too early attention to detail. To avoid confusion, however, our attention will be confined entirely to the type which should be form-

ed in works engaged in the production or use of metals, for both these works will require laboratories of similar type and equipment. It is not within the scope of this paper to discuss design and equipment: these will depend largely on the staff, for each man will have his own particular method of attacking a problem put to him. The equipment, however, should include a technical library, and the staff should have access to current technical literature in all languages which they are capable of reading. Mr. Barclay has already outlined the work which a laboratory should undertake—in brief, his paper means that the works laboratory should be held responsible for the quality of the raw material and materials incidental to manufacture coming into the works, and also for the quality of the finished products. Such responsibility should have a very wide interpretation, probably wider than many chiefs of laboratories would like to see. It should not merely consist in writing out analytical reports and consigning them with a sigh of relief to some poor overworked works manager. Such procedure usually results in their being lost amongst other documents which are apt to accumulate on his desk. Properly interpreted there can be no question as to the utility of analyses, and wrongly interpreted they are worse than useless because they mislead, and the proper interpretation of analyses can only be done properly by some responsible member of the laboratory staff. I remember some time ago listening to a most interesting lecture on "The Worries of a Works Manager" before one of our engineering societies. The lecture was quite a long one, but in spite of this there was no mention of the interpretation of chemical analyses. In cases of doubt as to the quality of raw materials it should be one of the duties of the laboratory to take up the question directly with the suppliers, and not through the intermediary of a third party. Then less would be heard of such foolish actions as the rejection of a batch of material because analysis shows it to contain 0.033 per cent. of a certain impurity, while the specification demands that it shall contain not more than 0.030 per cent. Such an arrangement would prevent woeful misinterpretation of results, and incidentally would cut down the amount of transport carried out on the material, for there can be no doubt that such material frequently finds its way back again to the user, disguised under another batch number—a fate it so justly merits after rejection

*Paper read before the Institute of Metals on Wednesday, March 20, 1919.

on such trivial grounds. In addition there is the added advantage that the laboratory would take greater care in sampling and carrying out its tests. In cases where works are enabled to afford the luxury of a buyer, such a scheme need not necessarily cause clashing between the laboratory and the purchasing department. Their duties should be clearly defined; the laboratory should control quality, and the purchasing department should control prices after the quality has been settled. In a good organization there is ample scope for both departments, and they should be encouraged to work in closest co-operation. It frequently happens in a works that unnecessarily high prices are paid for certain materials because of groundless fears of using cheaper ones, whilst on the other hand false motives of economy in purchase often lead to vastly increased costs of production. In this respect the laboratory can be of immense practical use in making a study of the effects of variation in composition and physical condition upon the costs of production, and for this purpose a knowledge of prices is absolutely essential.

Another function of the laboratory should be to carry out research with the objects of discovering new products and processes and of introducing improvements into existing ones, and this function is the one most likely to appeal to the trained scientific mind. This branch of the work will include the investigation and rectification of faults. The last function is one which has already been dealt with by Mr. Barclay, and is the one which gave rise to the controversy in the discussion of his paper. Direct control should be exercised over all processes of a purely chemical or metallurgical nature, such as smelting, refining, remelting, annealing, heat treatment, electroplating, and so on. The determination of the extent to which the laboratory should exercise control is a very moot point. Certainly the laboratory should determine and directly control the methods which are to be adopted, but as to whether it should go further and control the questions of labor and costs is a very difficult question to answer at the present time. It depends so much on the personality of the laboratory staff. In the present state of evolution there can be few highly-trained scientific workers who have had the necessary years of experience to deal adequately with the thorny problems of labor. But the time will surely come when the complete control will have to be placed in the hands of the laboratory—the laws of evolution demand it. At the present time, however, there are very few works laboratories which have evolved sufficiently to take complete control, and it would not be fair to them to add to their already multitudinous duties. But it is not so much the object of this paper to dilate on the possibilities of works laboratories as to indicate to them, and also to manufacturers, the methods by which those possibilities can be developed. The possibilities of a

works laboratory are unlimited if the conditions are right and its work is allowed to develop on natural lines. Swamping at the outset is fatal.

Now there is a desire on the part of manufacturers to possess laboratories with an efficient staff, and there is the will to succeed on the part of the staff. So long as the two can adopt the right attitude towards each other success is assured. Right from the outset the laboratory staff should recognize that the works is not a philanthropic institution. The success of the laboratory depends upon its being able to turn its activities and accumulated knowledge into money, and is not in any way proportional to the product of the number of chemical estimations and the number of mechanical tests it can do in a specified time. Nor is success even determined by the sharpness and beauty of its photomicrographs. They are facetiously compared with the moon. The laboratory must be a really live institution, with a determination to get right down to rock-bottom facts. It does not assist the man in the works in the slightest degree to receive a report typed on a fancy sheet of paper over a flourishing signature explaining that a certain piece of metal has failed because "a microscopic investigation under a linear magnification of 1,000 diameters, of a longitudinal section after etching in a 2 per cent. solution of metanitrobenzol-sulphonic acid in iso-amyl alcohol indicates that the 'gamma' solid solution has not completely split up into the 'alpha' and 'beta' phases." Unless the laboratory can determine the real cause of the failure and indicate how such defects can be avoided in future, it has failed in its functions. It must get into touch with actual working conditions, learn the language of the works, and exert a friendly educating influence. Its attitude towards the workmen must be a sympathetic one, and endeavors should be made to bring about improvements by assisting the natural processes of evolution which we cannot fail to see going on around us. The writer of a leading article in "The Metal Industry" has pointed out that "a great deal of harm has been done in the past through the scornful contempt with which many skilled workmen have been regarded by enthusiastic university men and chemists." Rather should they marvel that such progress has been made under such trying conditions. There are always good reasons for carrying out operations in a certain way, although there may be still better ones for doing them in different ways. The resentful attitude towards changing long-established customs is a perfectly natural and honest one, and Mr. Heathcote was quite right in regarding with suspicion the man who does not start off by opposing suggested alterations. Experience is a most valuable factor and should be given most serious consideration, and until the laboratory has gained the confidence and co-operation of the practical man it has still a long way to go before it can reach the pinnacle of

its utility. The practical man can give invaluable help in working out little details which are essential to the success of any scheme, and once his confidence is gained he becomes a most useful constructive critic. Not that there is any truth at all in the mouldy old adage, "an ounce of practice is worth a ton of theory." This is usually the last resource of the individual whose reasoning faculties are exhausted. The age when theory and practice were considered antagonistic is as dead as the dodo. Theory and practice must work hand in hand, and if the practice is successful and the theory does not fit in with it, then must the theory be "modified" or consigned to the scrap-heap, where it will not be lonely. The staff of a laboratory must get out into the works and make a detailed study of things as they are and why they are as they are, for only in this way can any real and lasting improvements be effected. It is frequently thrown at scientific men in general, and the chemist in particular, that they are woefully lacking in tact, sense of proportion, common sense, knowledge of the human element, and so on. But all these faculties can be acquired to a very large extent, and the method of doing it is to practise self-control. A man who can manage himself is on the right road, and has made a good start towards the management of others. The main value of experience lies in the knowledge of the human element which can be gained thereby.

In the discussion of Mr. Barclay's paper, Mr. Heathcote very wisely pointed out that when a laboratory is installed in a works, not only is the laboratory being tested, but simultaneously a test is being made of the fitness of the works to possess a laboratory, and very frequently the failure or incomplete success is due entirely to the attitude of the works. But it is not intended to arraign manufacturers for their past sins—it would take too long. Past sins are generally the result of ignorance, and the time will be much better spent in attempting to educate manufacturers in the way they should use a laboratory, and the treatment which they should mete out to it. Just as a plea has been put forward to the laboratory to adopt a sympathetic attitude to the works, so must the works extend a sympathetic and welcoming hand to the laboratory. The manufacturer must be imbued with the right scientific spirit, and must be prepared to take the laboratory into his fullest confidence. It must be recognized that the task set is a most complex and difficult one, and one which is not rendered simpler by the fact that its activities are bound to meet with a certain amount of opposition born of prejudice. The scientific worker must be given a status which is at least equal to that of the barrister, lawyer, or doctor. And, after all, why should it not be so, for is not his training as rigorous? The manufacturer must recognize that to the scientific worker a knowledge of chemistry, physics, the principles of engineer-

ing, mathematics, metallurgy, drawing, geology, and modern languages are absolutely essential. Is the man who has the intellect and patience to acquire a knowledge of these subjects to be treated lightly? Mr. Heathcote was quite right when he said that omniscience was demanded of a works chemist. Under existing conditions a chemist was expected to possess, in addition to his knowledge, common sense, adaptability, powers of observation, intuition, and a hundred and one other faculties which are commonly regarded as the gifts of nature. If he does not happen to possess them he is voted a failure and treated with scorn. To a very large extent the scientific worker has never been given the opportunity to develop these faculties. How often is the complaint heard that a chemist of undoubted ability, able to make important discoveries and is yet incompetent to put them on a sound commercial basis. Should this count to his discredit? Certainly not, particularly when it usually acts to his own personal disadvantage. Business ability should no more be demanded in a scientific investigator than should scientific ability be demanded of a sales manager. The very existence of commercial ability almost postulates an inferior degree of scientific ability, because commercial ability demands as its reward financial success, which has certainly not been afforded by a scientific career up to the present. The application of science to industry is in the process of evolution; at the present time the demand for the scientific worker exceeds the supply, and the best way out of the difficulty is for the manufacturers themselves to take a hand in the proper training of promising material. Then we shall hear very much less of the ineffectiveness of the scientific worker, because the manufacturer will take care that the product he has helped to mould shall have suitable opportunities to develop those faculties which the chemist is blamed for not possessing. In the past low wages to the chemist have been the rule. Considerable complaints have been raised from time to time against this, but it ought to be more widely understood that the scientific worker's objection is not so much against low wages but against the fact that his abilities have not been given proper scope so that he could prove his true economic value. Modern industrial conditions demand capital, brains, and labor, and the impression that they are antagonistic is just as fallacious as the idea of science opposing practice. Rightly or wrongly, there is a considerable feeling in the country that in the past more than the due share of the reward has accrued to capital. Already there is a movement on foot for a closer union between labor and the brain workers of the country. The best and most lasting reforms are those which come from within—a fact which capital would be very wise to take to heart. But this is diverging somewhat from the subject, but in regard to the question of financial reward it is

important to bear in mind that it is most desirable that the possibilities for the scientific worker in this respect should be such as to attract the highest type of brain into the profession. Another important point is that the laboratory staff should consist of a sufficient number of men of the right type, men of proper training, to take advantage of the opportunities to be offered to them. And even when all these things have been attained the laboratory must not be expected to perform miracles in the tying of a cravat. The development of new, and the improvement of old, processes demands research, often of a most intricate and difficult nature, and it is given to few manufacturers to realize the difficulties of research, even when the research is assisted by the element of luck. The completion of every piece of research renders succeeding ones more and more difficult, and it must not be forgotten that once a research is brought to a successful issue its results stand for all time.

The success of a laboratory depends therefore on:—

1. Possession of a proper equipment, which includes an ample number of properly trained scientific workers.
2. Mutual existence of the right attitude of mind between the works and the laboratory.
3. Complete confidence and sympathetic assistance of the management, more particularly with regard to those matters requiring what may be described as commercial ability for want of a better term.

It is not intended to say very much with regard to the training of chemists, although it is pretty obvious that this will exert a large if not deciding interest on the degree of success. The subject was very thoroughly threshed out in the Journal of the Society of Chemical Industry in 1908. Difficulties have arisen in the discussion of the subject, because manufacturers complain of teaching institutions being too academic and expect them to turn out finished technologists. Even if this were possible, it would take from ten to fifteen years, during which time the opportunity of becoming acquainted with the human element is cut down to a minimum. Teaching institutions can do their best work by giving their students a thorough groundwork in the fundamental principles of chemistry on a very broad basis. This in itself is no light task, demanding as it does a contemporary grounding in general physics and mathematics. A man with a good all-round training will be competent to take a post in any of the numerous branches of industry. At the conclusion of the training, which will take three years at the least, a certain amount of original research work should be necessary for the granting of the diploma. The final training of the trained chemist into a technologist cannot be carried out in a teaching institution. The necessary practical bias can be introduced into training by the intro-

duction on to the teaching staff of highly qualified men who have made good in industry, and by insisting on the necessity for real practical experience on the part of the teachers. Serious consideration should not be given to the charge that chemists lack commercial and controlling ability. Up to the present time they have had little or no opportunity of demonstrating whether they possess it or not. If it so happened that some particular individual did not possess such ability, it is certain that he would be given neither chance nor assistance to develop it. If the desire of industry for the assistance of scientific knowledge is real its duty is clear. It must take a definite and positive interest in the training of the potential technologist, not only in assisting teaching institutions, in the acquirement of a staff, but also in promoting and influencing research. But certainly its most important function lies in the direction of the provision of adequate scope and opportunities for the industrial laboratories.

STORING AIR IN THE EARTH

A novel method of providing a receiver of unusually large capacity for compressed air was described by Mr. N. Knapp in the course of the discussion of a paper on natural gas storage, read before the American Institute of Mining and Metallurgical Engineers. Mr. Knapp required a supply of compressed air for working pumps used to raise oil from wells and for blowing out the oil from the wells directly. He connected up an old exhausted well to the air compressors, and for a period of seven years used the well as an air receiver. With this storage system, many times the capacity of the air compressor could be used for short intervals without any appreciable loss of air pressure, and when no air was being used there was no appreciable gain in pressure. Two two-stage compressors were used with approximately 200 horsepower gas engine capacity, running twenty-four hours per day. The original rock pressure of the depleted sand was 305 lb., and the open flow capacity of the well as a gasser was about 2,000,000 cubic feet per twenty-four hours. When the air was pumped into the well, the gas had been used down to a rock pressure of 115 lb., the production was small and the gas was wet and troublesome to use. In the course of a few months' use of the compressors, a rock pressure of 290 lb. of air was developed and there was no water trouble. The extent of the sand used for air storage was small, probably not over 20 or 25 acres, as shown by dry holes and exhausted wells. The thickness of the porous gas sand probably did not exceed 7 ft. The occasional gas sands of this region, Mr. Knapp imagines, were like isolated hillocks of sand resting on the salt-water sand that underlaid the whole country. The depth to the gas sand was about 800 ft., and it underlaid the oil sand.



WHAT OUR READERS THINK AND DO



PULLING HOOK, WHICH PREVENTS SMASHED FINGERS

By S. T. Barnum

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When hooks of the ordinary design are used on the end of a chain or line for pulling things around by power—by horsepower, cranes or hoists—accidents occur frequently. The man whose work it is to engage the hook in the object to be pulled becomes careless and, in an endeavor to catch the hook in the hole which is to receive it, will—as the pulling line is being drawn away from him—take a chance and try to effect an engagement “on the fly.” Sometimes his hand may be wedged between the hook and the object and smashed fingers will result. Occasionally the fingers thus injured must be amputated.

With a hook made in accordance with the design suggested in the illustration, such accidents are, largely, prevented. The “safety first” hook shown has a finger hole whereby it may be held and which disposes the fingers in such a position that they are not likely to be caught and mutilated.

The proportions of such a hook should vary in accordance with the work to be handled. For heavy work a relatively large hook is, obviously, necessary, while for light pulls a small one will suffice. In any case, the length of the finger opening (L, Fig. 1) should be sufficiently long, about 4 in., so that the fingers may be readily inserted in it. Correspondingly, the height (H, Fig. 1) should be at least 1½ in. Satisfactory hooks of this character, where the service is not too severe, may be cut and forged from sheet steel plate.

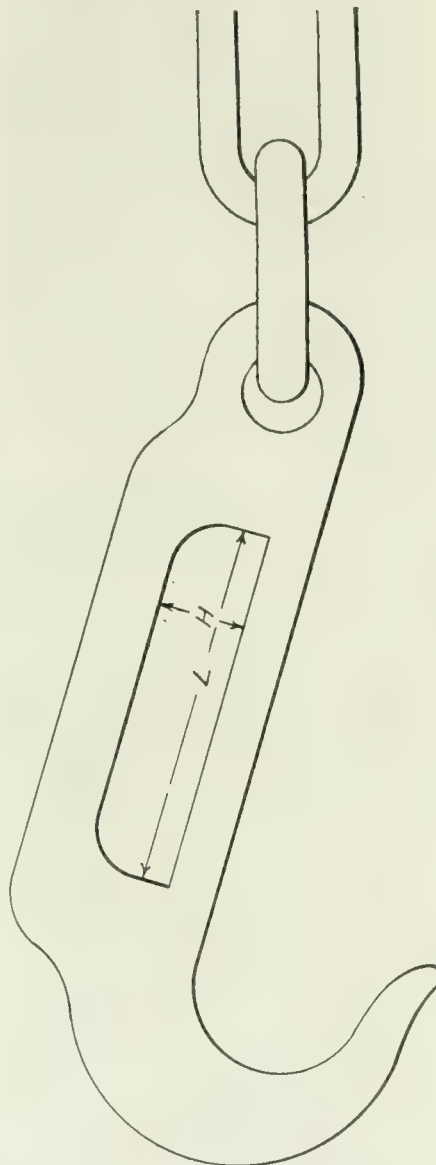
TO STRENGTHEN AN AXLE BY REMOVING METAL

By A. J. GRAY

We were having continuous trouble with the axle of a logging car. The axle apparently gradually fatigued and broke off on the outside of the bearing close to the collar as shown in Figure 1.

The roadway is not as smooth as might be, and the continual pound had a hammering effect that caused the break, in spite of the fact that the axle had a more than sufficient factor of safety to take care of all the dead load.

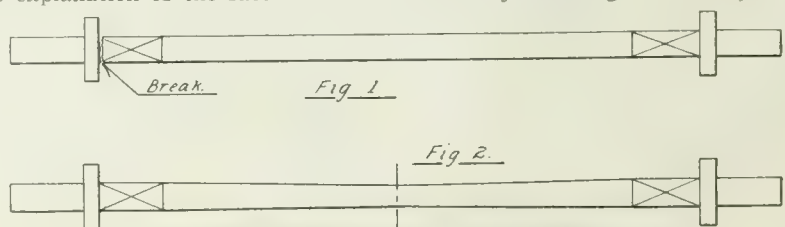
The trouble was remedied by tapering



VIEW OF THE HOOK.

the axle to the centre, as shown in Figure 2.

The explanation of the fact of remov-



SHOWING THE TWO STYLES OF AXLES.

ing the metal from the centre of the axle having a strengthening effect is found when it is understood that the reason for failure was the hammering on the axle caused by the poor road-bed. The force tending to cause fracture would be the foot-pounds of energy that has to be absorbed at the neck of the axle where the break occurred.

Energy is a combination of two factors. That is, $\text{energy} = \text{force} \times \text{space}$. It will follow that the greater the space moved through the less will be the force of resistance caused in absorbing the energy.

This explains the fact of the axle as made to Figure 2 being the strongest, as in giving slightly at the centre it allows more give at the neck, which is equivalent to a greater space moved through to absorb the same amount of energy of the pounding, thus producing less strain in the metal of the axle.

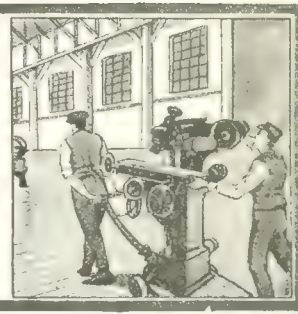
VENTILATING OLD BUILDINGS

Many times the ventilation of a factory is not considered when the building is built. This is particularly true of old buildings. In other cases a top floor, which has always been in use as a warehouse, is necessarily turned over to factory purposes. In such makeshifts, light and ventilation are often inadequate.

In one plant, the top floor of which was not well ventilated, the heat during the summer months prevented the workers from applying themselves steadily. To better this condition large square shafts or pent houses were built in the roof. Each of these shafts was about 20 feet square—the size of a bay. They were fitted with windows which could be easily opened, thereby making not only excellent ventilators but also letting in much natural light. The fresh air and light improved working conditions by reducing discomfort.



DEVELOPMENTS IN SHOP EQUIPMENT



LANDIS GRINDER

A VERY rigid type of machine, built for accurate crank pin grinding on airplane, automobile and other gas engine shafts. No offset centres are required with these machines, the work being held by quickly-operated holders at both ends.

The crank shafts are driven from both ends, the right-hand and left-hand crank heads being geared together. The different throws are obtained on the adjustable heads from a sliding adjustment of the crank carrying fixtures which are mounted on the ends of the crank head spindles. This is micrometer adjustment,

Accurate alignment of the crank carrying fixtures is accomplished by a simple adjustment of two screws carried in the hub of the spindle gear mounted on the spindle in each head. Another function of these screws is to hold the gear in a positive relation to the shaft, taking the place of the customary key. When the crank heads covers are removed these screws are easily accessible. Counter weights for the work are fastened to each side of the spindle gear, between the spindle bearings, and in a position where they will not influence the end of the spindle.

The crank head spindles are large in

heads along the shaft to suit the length of the work, the taper keys are released by a simple screw adjustment, after which the keys are again tightened, thus doing away with the possibility of play between the shaft and sleeve. These taper keys can also be used for securing a fine adjustment when aligning the two crank heads.

The driving sleeve is mounted in bronze bearings, one at each end of the sleeve, and the driving gear is mounted on a taper between the bearings. The gear is drawn up on the taper by a nut on the sleeve, effectively preventing any looseness between the joint. This gear, like the spindle gear, is also fitted with adjusting screws instead of a key for positive location of the gear on the driving sleeve. Both gears in the crank heads run in an oil bath, thus creating smooth action and prolonging the life of the gears.

The work table swivels for grinding tapers.

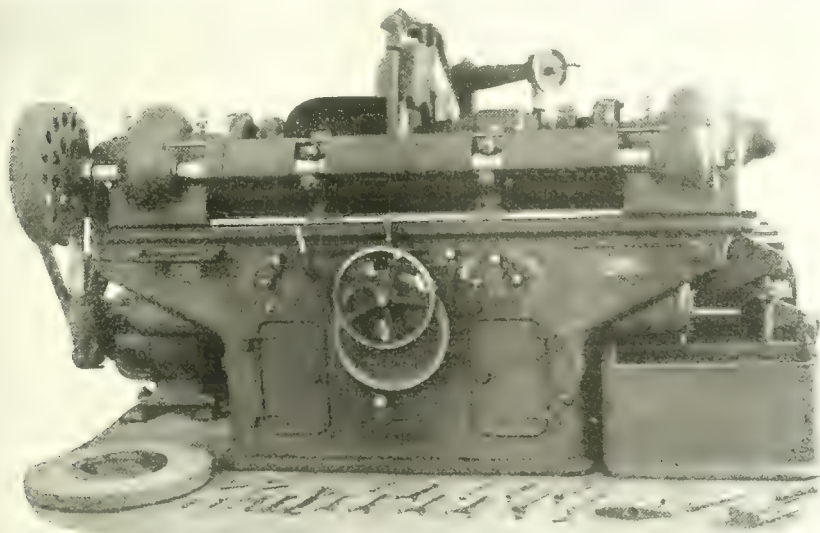
The work speed changes are made by the shifting of a belt on cone pulleys, through the movement of a single lever.

The grinding wheel head is massive and rigid and mounted to slide on a large V and a flat guide. The spindle is of special steel and runs in bronze bearings which are adjustable for wear. The grinding wheel driving belt is always kept under uniform tension by an automatic tightener, which also takes up the stretch of the belt.

Feeding of the grinding wheel to the work either by hand or automatic. The automatic feed can be set to reduce the diameter of the work from .00025 in. to .007 in. at each reversal of the wheel carriage. The machine is equipped regularly with hand feed only, and the automatic feed is furnished when specified.

The grinding wheel traverse feed is automatic, and all of the respective speeds are obtained by the shifting of a belt on cone pulleys by the movement of a single lever. The grinding wheel carries automatically at the reversing points, permitting the wheel to grind itself clear at shoulders before reversing.

A spacing bar arrangement for quickly locating the grinding wheel to suit the crank pin locations is supplied with the machine when specified. This device is a great time saver when grinding the same crankshaft in large quantities. The same machine can be equipped with spacing bars for several different types of



GENERAL VIEW OF MACHINE.

operated by a screw and having a graduated dial in connection with it.

For multiple throw shafts, the pins are ground in exact relation with each other, and to accomplish this, one of the carrying fixtures is provided with a gauging block, made to suit the throw angles of the crank shafts.

The crank-carrying fixtures will be equipped with a swiveling index, when preferred to the standard gauging block. This swivel is graduated to give all of the regular throw angles. Also, when desired, fixed throw heads will be furnished instead of adjustable heads. For manufacturing large quantities of crank shafts having the same throw, the fixed throw is often preferred.

diameter and are provided with long phosphor bronze bearings, which are adjustable for wear. The spindle gear is mounted on a tapered portion of the spindle between the spindle bearings. This arrangement eliminates the possibility of influencing the end of the spindle through the spindle drive and also permits the mounting of work carrying fixtures directly on the end of the spindle and close to the spindle bearings.

The rigid main drive shaft operates the crank heads through a steel sleeve carried in each head, and the gear that drives the large spindle gear is mounted on this sleeve. The driving shaft and sleeves are fitted together with taper keys. When it is desired to slide the

crank shaft as it is very easy to change the spacing bars.

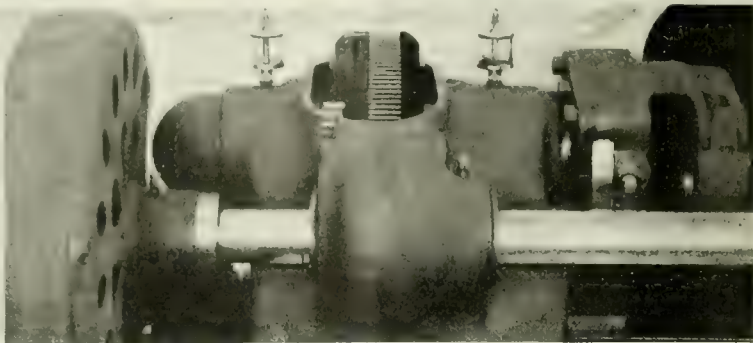
All crank-grinding machines are provided with a lever for connecting and disconnecting the carriage traverse. When spacing bar arrangement is included, this lever has the additional function of engaging the plunger in the spacing bar slots. The spacing bar and the power wheel traverse cannot be engaged at the same time. The crank grinding machine, whether with or with-

out spacing bar, is always provided with a safety device for preventing the power traverse to run into the crank shaft.

The grinding wheel truing fixtures regularly furnished, are used for truing either the face or sides of the wheel. A radial wheel truing fixture, which is suited for truing the face of the wheel, also for forming corners to an exact radius for grinding fillets up to $\frac{1}{2}$ in. radius, will also be provided on special order.

The rests support the work at two points, in front and underneath. The supports are adjusted independently of each other, which is essential to grinding work true. The support adjusting screws have stops which can be set to limit the movement of the rest jaws.

The pump is of the centrifugal type, the bearings of which do not come in contact with the water. The case in which the fan revolves is always immersed, hence no priming is necessary.



TWO CLOSE-UP VIEWS OF MACHINE.

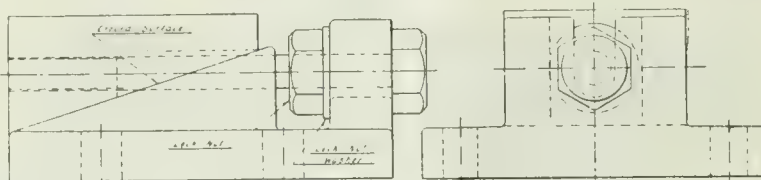
MANHATTAN UNIVERSAL CASTING GRINDING MACHINE

THE Manhattan Machine and Tool Works, 42-50 Market Ave., N. W., Grand Rapids, Mich., has recently placed on the market the universal casting grinding machine shown in the illustration. It is stated that the machine is easy and rapid to operate under the varying conditions such as are met in everyday use, and that its rigidity, strength and flexibility are notable features. The universal movement is obtained by a universal coupling and sleeve, which gives a freedom of movement without undue loss of power. The long handle gives the operator a good leverage, so that the pressure applied to the grinding wheel can be easily regulated. Lubrication is taken care of by wick oilers and drip cups. The standard equipment consists of countershaft, counterweight, two pulleys for the counterweight cable and the machine itself.

CINCINNATI PLANER LEVELING BLOCK

An improved type of leveling block for use in setting up planers has recently been placed on the market by the Cincinnati Planer Co., Cincinnati, Ohio. It is a

perienced through their showing a tendency to shift, even where the precaution has been taken of grouting the blocks in concrete. Any such shifting of the blocks upon which a planer is mounted naturally throws the machine out of level.



GENERAL VIEW OF THE BLOCK.

matter of general knowledge that a planer must be set up on a perfectly level and rigid foundation in order for it to continue to give satisfactory service; and under the severe conditions of load and vibration to which the foundation blocks used for supporting machines of this type are subjected, trouble has often been ex-

The new style of Cincinnati planer leveling block is so designed that it eliminates the cause of trouble to which reference has been made. This improved block consists of a baseplate and a sliding member which is actuated by a draw-bolt that is furnished with a thread of fine pitch, a lock-nut and a washer. The baseplate is cast with a wide flange, and it is drilled with four 1-inch holes which are found to be of great assistance in helping to grout the block in place. The inclined surfaces of both the baseplate and sliding member are ground to a perfectly smooth surface, so that they slide freely on each other; and this feature in conjunction with the fine pitch of the thread of the draw-bolt greatly facilitates the making of accurate adjustments. The draw-bolt is $\frac{3}{8}$ inch in diameter and it is threaded for practically its entire length in order to accommodate the lock-nut. The design of the block is worked out in such a way that $2\frac{1}{2}$ inches of the thread on the bolt are engaged at all times, so that ample holding power is assured. With a block of this kind, accurate settings can be easily made, after which the lock-nuts are tightened so that vibration will not tend to cause the blocks to shift and throw the planer out of level.



GENERAL VIEW OF THE MACHINE.

Worth-While Information From Many Points

In one second an auto traveling at 20 miles per hour will cover a distance of 29 feet, at 25 miles 36 feet, and at 30 miles per hour 44 feet will be covered.

Sandpaper can be used much more effectively for removing the insulation from wire than your pocket knife. With the right hand, pull the wire through a small double strip of sandpaper held between the thumb and forefinger of the left hand.

Look out for doctor fees soaring in the near future, now that a start has been made in using an airplane for professional calls. Dr. Frank A. Brewster, of Beaver City, Neb., as the distinction of being the first physician to adopt this method of transit.

The tallest people in the British Isles are to be found in the district of Gallo-way, in South Scotland, where records of the stature gives an average height of five feet ten inches. The shortest stature is found in Wales and southwest England.

Half a mile underground in a Western mine there is a large blazing electric sign, which simply shrieks at you the words "Safety First." You cannot help but pay attention to this warning, for the fact that you are down in the bowels of the earth sort of brings to your mind the extra need of care.

The manila hemp, or abaca, as it is known in its native land, is a great source of income to the Philippine Islands. The sum received yearly from its sale amounts to \$20,000,000. The hemp, of course, is used in making the better class of rope, usually known as manilla.

Tanks have had some funny uses, but listen to these: At Brest, American soldiers turned the sod for tennis courts with the aid of a tank. At London, tanks made ideal grandstands; while last, but not least, at Limerick, Ireland, tanks were called out to preserve the peace while the remains of a Sinn-Fein hunger strike was carried to the grave.

Since the armistice brought hostilities to an end it has been learned that the morale of the population of Lille was maintained by news given from a French wireless station hidden from the Germans, according to "Wireless Age." Good news spread quickly through underground channels. The people knew that 10,000 American soldiers were arriving daily. Airplanes also dropped many leaflets, which were eagerly taken de-

suite German efforts to prevent their distribution.

After the electrically heated clothes for airmen comes the electrically heated quilt for hospital patients, and invalids taking outdoor treatment. Very fine and pliable resistance coils are used, and it is said that a temperature of 90 degrees can be obtained in half an hour, and maintained continuously thereafter with a small expenditure of current.

Recently a baby tank started out in the interest of the American Victory Loan to reach the summit of Pike's Peak. In many places it encountered drifts of snow ten feet deep. The tank itself weighed 13,600 pounds, yet still plowed merrily on until a tract plate broke. This finished the trip, so, although they did not reach Pike's Peak, they did the other thing, namely, bust.

On the sead bed at the head of the Persian Gulf, deep under many fathoms of salt water, there are springs of pure, clear, fresh water. Divers, with goat-skin bags, descend and bring this to the surface, their equipment being the same as that of the pearl fishers. This is a stone to sink them, held between the feet, and the ability to stay under water from 2 to 3 minutes without injury.

The best way to save small pieces of magnet wire, which have served their purpose in connecting some apparatus, is to coil the wire in the form of a spring closely wound on a pencil or some similar object. When ready for use again, the coil of wire can be stretched to the required length. The spring of wire helps to make better contact. Connections made in this manner are also much neater than when the wire is strung out haphazardly.

To fasten the loose end of a spool of magnet wire, double back enough of the loose end to reach around the coil, stick this doubled back end through the loop formed by the doubling and bend over. This is a much better way to keep the wire from uncoiling than merely raising a turn slightly and sticking the loose end under it. If a kink appears in the wire, it should be carefully straightened before proceeding.

The "Daily Mail" reports that on September 22nd last, direct wireless communication between Great Britain and Australia was established, when two messages from the Premier and from Sir Joseph Cook were received by the Amalgamated Wireless Company of Australasia from the new station at Car-

nar. It is stated that the messages received at Sydney were perfectly clear and distinct, despite direct transmission over 12,000 miles.

The war has shown the Australians that they have capabilities which were never used in pre-war days. They are now manufacturing clothes and boots of an excellent quality at prices about 33 1-3 per cent. less than the same quality of goods made in Canada and the United States. The cloth is of a soft, smooth texture, containing a large percentage of pure wool.

H. H. Kohlsaat, one time owner of the Chicago "Times-Herald," was one of the first public men on this continent to interest himself in the automobile, and in the summer of 1895, offered prizes for the purpose of "promoting, encouraging, and stimulating the invention, development, perfection, and general adoption of the motor vehicle." He offered prizes aggregating thousands of dollars, and the prizes were based on the following: (a) practical construction; (b) speed; (c) cost; (d) economy; (e) general appearance.

There is now invented a machine that pulls flax mechanically. This is an English device and can be operated by horse-power or tractor. It looks like a huge sprocket, with the circumference braced by three powerful iron spokes, and a caterpillar tread running out to a smaller sprocket. As it rolls forward the machine gathers a section of the standing flax plants. The seed bolls come between two prongs. The diggers now penetrate the soil and tear up the plant by the roots. Next the uprooted flax is carried over top of machine to an endless belt, which rolls the flax over until it drops on the ground behind. There it is left to dry.

Thomas A. Edison, the electrical wizard, was the first well-known American to prophesy that the automobile would revolutionize transportation. Nearly twenty-five years ago, he is quoted in a New York paper as saying: "Ten years from now we will be able to buy a horseless vehicle for what you would have to pay to-day for a wagon and a pair of horses. The money spent on the upkeep of the horses will be saved. A great invention, which facilitates commerce, enriches a country just as much as a discovery of gold." Looking back from the pinnacle of 1919 automobile development, it must be a source of great satisfaction to know his prediction was conservative rather than radical.

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Go It, Governor!

ON the Fourth of July speech-making is as great a national industry in United States as it is in Orange centres here on the 12th of the same month.

And so it was that Governor Coolidge, of Massachusetts, in his home town of Northampton, on July 4, said this:—

"The Americans are not a fighting people, but when there is a just cause they answer the call, and take up arms for the right. We have saved France, rescued Belgium, defended Italy, and saved England its one thousand years of civilization."

Good boy, Governor! In the words of the small boy, you were going some!

But, say, Governor, did it ever occur to you that brainier, brighter and bigger men than you have long since ceased any show of boasting? The nations that paid the awful price for world freedom are bowed in solemn and magnificent thanks, all too eloquent to permit of any loud-mouthed explosions.

Helping Coal to be Dear

ALREADY the public are being told that coal is going to be very dear this winter, and also very hard to get.

This would take place likely at any rate, but the education of the public must go on, apparently, through the insertion of such news. It may interest readers to know they will be mulcted an extra four or five dollars per ton for their coal this winter, but it also helps to make the way easy for all and sundry who have to do with the setting of the price.

The truth is that the prices will get up high enough without any tinkering assistance on the part of the press.

Already officials of the U.S. Government are quoted as follows:—

"Coal men fear the situation may get away from them, and that prices may rise five or six dollars a ton."

If there is a danger of the situation running wild, the Government can check it if it so desires. During the

war the price of pig iron and steel started to run wild. The Government found it easy enough to fix the price of iron and to say that 3c should be the outside figure for ship plate.

Any sort of a nag will run away if they take off the halter, show it a lot of green grass and oats ahead, and then hit it a kick. In fact, a nag that would not run under such circumstances would not be worth worrying about.

Coal companies and kindred agencies are somewhat the same. Take the restraint off, show them where they can bulge with money, and let the dear general public start to clamor for coal.

Will prices go up under such circumstances?

Just as sure as the nag would bolt for the hay and the grass in one case, the prices will bolt for the higher peg in the other.

Henry Ford in Court

IN a large number of the daily papers there have appeared editorial comments, some at considerable length, concerning what Henry Ford has said and admitted in the witness box in his suit against the *Chicago Tribune*. No doubt Ford has told enough to make it certain that he is not a keen student of political science nor historical matters.

These articles for the most part are concerned in taking a fall out of Henry Ford, largely because he admitted he did not know at times what he was talking about.

Are there never occasions when the same daily papers discuss subjects in a way well calculated to make the informed reader see they do not know what they are talking about?

Many Canadian editors discuss the problems of the British navy, and many of them have never sniffed salt water.

They pile into long-distance discussions at times of semi-technical matters in a way that shows how barren they are of even the fundamentals of their subject.

Why not take Henry Ford in his own back yard, namely, as a manufacturer and an organizing genius?

Why not take him as an employer who long ago put in a \$5 per day wage, then a \$6 and \$7?

It is somewhat of a knot-hole vision to size up a successful man entirely on a matter and in a field where he is admittedly not a specialist.

IF THAT peace celebration on Saturday could only have included industrial peace as well it would have been a celebration well worth cheering for.

* * *

THE British sovereign is now worth only \$4.25 in United States. Rather alarming, but then it's no worse than what has happened to our own dollar. It's wizened up to about 30 cents.

* * *

WHAT kind of men are your apprentices turning out to be? Are they good mechanics? Are they in demand in other shops? Have they gone on to be foremen and superintendents? Look this matter over and remember your shop has a responsibility in connection with every apprentice you turn out. Very often a shop is judged by its graduates.

* * *

CANADIAN MACHINERY'S drafting course had over 20 students sending in their work regularly for examination, and the number is constantly increasing. Some of those following the course are from the Maritime Provinces, Chicago, Hartford, in the United States, and the rest in the industrial centres of Ontario. In many cases shops are subscribing for the paper for their apprentices to study. This we take as the greatest compliment that can be paid to a technical paper.

Is the Draughtsman's Profession Crowded

BY ENGINEER

THE anxious parent, looking for an opening in life for his ambitious offspring, may perhaps be seized with the idea of making him a draughtsman. The profession on the surface looks attractive. The hours are not long, the work is performed amid clean and well-lighted surroundings, and the youth does not have to soil his delicate hands by handling greasy machinery, or heavy tools.

Then, when his apprenticeship is over, he can obtain fairly lucrative work, without much difficulty. When we say fairly lucrative, we mean he can earn a little less than the average machinist, and his status will be, from an employer's point of view, a little below the machinist.

Many employers quite frankly look upon a draughtsman as a necessary evil, and his work as non-productive. In some cases this is true, and the product of the drawing office is more in the nature of a record than a guide. The writer remembers well the case of a large pulp mill, where new gears were designed by the patternmaker, and the sketches for the drawing office made from the finished wheel. The necessary evil was well exemplified in this case. True, the patternmaker could have made the drawings also, but his time was too valuable.

What is the Reason?

The cause of this lack of status of a branch of engineering that should stand high, can be found in two things. One of these is the looseness of the use of the term "draughtsman," and the second is the training or lack of training that the apprentice draughtsman receives.

The dictionary defines a draughtsman as one who draws machinery, or drafts pleas, or generally, one who makes drawings. That description fits the majority of the men engaged as draughtsmen, and therein lies the root of the trouble.

The ability to draw is the first requisite of the draughtsman, but by no means the only one. In the engineering world, the term draughtsman should cover the description of one who can evolve a design, making all the necessary calculations, and having a full understanding of the operations and difficulties of the actual making, from the patternmaker's, molder's, and machinist's point of view.

How many men calling themselves draughtsmen can fill the above qualifications? A small minority, it would seem, and these are usually known as designers, not draughtsmen. Here then, we have a distinct branch. Then again there is what is known as the detailer. He takes the general design of a machine or engine, and fills in the details. Then there is the man who never does anything but tracing. These three classes are all too often lumped under the general term draughtsman, and this fact makes it more difficult for the few who are really draughtsmen in the engineering sense of the word, as against the dictionary definition, to get a suitable reward for their abilities.

What is the Training?

Where do all these detailers and tracers come from? They are being turned out daily after spending four more or less valuable years in a drawing office, learning to be draughtsmen (?). What is the usual course of instruction that the apprentice goes through? Different firms have different methods, but a fair sample probably is as follows:—

The first job will be filing drawings, and making himself generally useful. He has about one month of this, and on the whole, it is a time well spent, as it will give the neophyte an idea of routine. Then he will spend two to three months on the blue print making, either by machine light or sunlight. The utility of this is open to doubt, if the object of his training is to make him an engineer.

A few days to give him the idea of how it is done would be ample, as it is not the work for a skilled man in any case. From this he will go to the drawing board, where he will take up the work of tracing, first small details, and then the general assembly tracings. This work will make him proficient in the use of instruments and teach him to be neat, and he will spend a period of probably one year on this work, perhaps longer.

Up to this time, unless he is ambitious and has an opportunity of attending technical classes, he will have acquired practically no knowledge of the things he is tracing. He may have walked through the shops, and observed different things in the making, and connected them in his mind with the tracings he has been making. Or he may not. It is quite likely no one will bother him enough to find out. However, he eventually gets to the stage of making drawings of details and small sketches, made from the rough sketches of the designers, and from that to the making of assembly drawings. Now after having spent four years of his life, what is he? Not an engineer, not a designer. He may know something about shop work. Quite likely he does not. What will he develop into? If as before said, he is blessed with ambition, he will get out of the drawing office as fast as he can, and get a course in the shops, to find out something of what he has been drawing. He will also take a course of mathematics, sufficient to enable him to grasp the fundamental ideas that make the finished article possible. Most likely, he will remain where he is, and add another unit to the army of necessary evils!

Is the apprentice to blame, or is it the system? Emphatically the system. A boy who is going to become a draughtsman, in the true sense, is going to be a mechanical engineer. Then he should be trained as such. His first entrance should be into the shop, and not the machine shop particularly. He should have an opportunity of a period in the pattern shop, not to become an expert manipulator of a patternmaker's tools, but to find out how patterns for different jobs are made and why. Then into the machine shop, to become familiar with the different machines and their uses, and the particular jobs that can be done in them. The erecting shop should follow, after which he would be in good shape to learn the art of designing. During this time the apprentice's mathematical education should be developed, and after a period of say two and one-half years spent in this way, a further two and one-half years could be profitably spent in the drawing office. This period would be valuable to him, and owing to the knowledge acquired, to his employer. A course of training of this kind would have two excellent effects. It would eliminate quite a number of those who choose the drawing office for its comparative ease and lack of unpleasant surroundings, and automatically raise the standard of those who remain. The employers would know they were getting better men, and the men themselves could organize to improve their status in the engineering world. "Tis a consummation devoutly to be wished."

Furthermore, a man trained in this way would not be confined to the particular work carried on by the shop he was trained in. His knowledge of engineering practice and his developments of mathematics would enable him with a little study, to take up any branch of engineering design which he might wish to specialize in, or he might develop into an all-round man in all branches of mechanical engineering.

Five years is none too long a time to learn a profession, if it is to be a profession. Furthermore, such a course would ensure that in a short time there would be only one answer to the question of "Is the profession overcrowded?" and that would be an emphatic "No."



MARKET DEVELOPMENTS



Metals Advancing Sharply in Busy Market

All Grades of Copper Go Up This Week—Scrap Dealers Paying Better Prices—The Used Machine Still a Big Factor in the Sale of Equipment

IT is not very often that the scrap metal market is called on to provide the best news for the week, but such is the case this time. The big dealers in Toronto marked the whole list up this week, special attention being paid to anything in the line of copper. The metal market regards it as certain that there will be a big export demand for copper very soon, and as there is not a great quantity being produced owing to labor troubles, the prices are due to go higher. Not only that, there is a demand for scrap metal. The foundries and the steel mills are buying material now and there is a lot of business moving.

Machine tool dealers still have to contend with the problem of getting the buying public away from the used machine tools that came on to the market when war work ceased. Many of the inquiries that come to the dealers contain the request that prices should be quoted on used as well as new machinery. There has been no concerted

action on the part of the dealers in regard to the policy to be followed on the taking in of used material. Some firms are always in the market for it, and as a result other dealers, against their wishes, must figure on taking away old equipment if they are going to sell new.

One thing that makes used equipment attractive is the price of the new material. Prices are not far from 100 per cent. above pre-war days, and even now talk comes of increases. Some of the big shops have given a shorter work-day with the old wages, which amounts to an increase in costs, and the makers threaten to pass it on in the way of higher selling figures.

Pittsburgh steel mills report that they continue to work nearer to capacity. Plate is probably the weakest spot in the steel market at the moment. Reports indicate that while 2.65 is the nominal quotation, there are cases where as low as 2.50 has been the price at which a fairly good tonnage would be closed.

MONTREAL REPORTS BUYING IS STILL DONE ON RATHER SMALL SCALE

Special to CANADIAN MACHINERY.

MONTREAL, Que., July 24.—Trade improvement is undoubtedly more general throughout the district, and activity is gradually increasing in volume in the many industries of the country. Labor disturbances are still a factor in business circles, but disputes in the metal working trades are being adjusted to the satisfaction of all parties. The recent strike at the Vickers plant, which has just been settled, will affect the operations to some extent, and fewer launchings will take place this year than were expected. The announcement that the steel plate mill at Sydney will be completed, has created a waning interest in steel circles, but there appears to be few who think it will have much effect on local conditions. The price agreed on by the Government will mean that the output at that figure will almost all be absorbed for Government purposes, as a price of \$3.65 is rather high in face of the quotations of the American mills. That this condition may come about is seen in the announcement this week that additional contracts for steel vessels

have been made with some of the leading shipyards. Dealers here are more hopeful of the early future than they were a few weeks ago, but no heavy buying, as yet, is coming to the surface, although the regular business is improving slowly, the present demand still being such as to cover immediate needs only. Labor appears to be the keystone of true conditions and unrest must become history before any real signs of concentrated reconstruction will develop. As a dealer here remarked: "This factor of labor is the hinge upon which all things swing. Manufacturers are exhibiting no undue haste in getting back into harness, being content to carry on while these clouds remain upon the horizon. Until some general adjustment is made any extreme signs of exceptional activity might act as a signal for further unrest and demands of workers." Some little business has been done in structural materials, but general activity of a light nature is the rule. Machine-tool demand is quiet, but sufficient to maintain the interest of the trade. Metals

show a steady return to normal with the market strong. Old materials are not active, but a light, steady demand is reported.

Copper Strength a Feature

Copper continues to hold the interest of the trade, due to the steady domestic demand and the possible developments arising out of the changed conditions of world commerce. Germany will probably be a large buyer in this respect and copper will be a commodity of which she will require considerable quantity from the United States. With the exception of tin the metal market is quite strong. Brass interests are buying more freely and the demand for spelter is steadily growing. The lead situation here is firmer, following the American advance, but dealers are holding to the previous quotation of 7 cents per lb. Sales are not heavy, but the demand is steady. Antimony and aluminum continue unchanged. All metal prices are firm at last week's quotations.

Scrap Strong, But Less Active

The strength of the scrap market is maintained despite the slight decline in general activity. The iron and steel trade is demanding larger quantities of scrap and the movement appears to in-

dicating that business will be steady from now on. Metal scraps are holding the leading position and buying is on a larger scale than for some weeks back. The fact that trade with Germany is open again and the knowledge that she is depleted of this metal, is a large factor in holding the market at the present high level. No price changes are recorded this week, and the present market is very firm.

SCRAP METAL IS MARKED WELL UP

Biggest Increases That Have Been Registered for Many Months—Peace Signing Has Helped.

TORONTO.—Judging by the way in which the scrap metal market has shoved up prices it is willing to pay for material, the belief is gaining that the turn has been made in the road, and that business is going to get going in earnest. The scrap market can hardly be termed a chronic optimist either, for as a general thing they are not exactly keen to admit that business is good.

It is perhaps hard to lay a finger on specific instances in the markets this week where improvements are in order, or where more business has been done this week than for a certain stated period in the corresponding week. But there is an undoubted feeling in business circles that things are fundamentally strong, and that there is a real recovery in the market. It may be that the signing of peace has had something to do with it, as it means that there are markets open now that have been closed. This has a large effect on the metal markets, especially copper, as it is known that Germany will have to be a heavy purchaser of this metal.

The Second-Hand Stuff

"Look at this," said a well-known machinery dealer to a representative of this paper this morning, as he passed over a request for quotations on a certain amount of equipment.

There was a foot-note that spoiled the business from the standpoint of the keen salesman, and it was this: "We would refer prices on used equipment, as we are told there is considerable of this to be had in very fair shape."

"Some dealers state that they do not have much trouble in meeting the request for second-hand or used material," continued the dealer, "but I can tell you we are up against it all the time on this point, and I am inclined to take with a grain of salt all these statements about not having to contend with the man who has it in his head that the market is full of bargains in machines that have only been used for a couple of days or a week, or that have never been taken out of the cratings at all. As a matter of fact, the best of this stuff has been picked over some time ago, but there are occasional lots that keep coming on the market. We cannot state that this business has been as serious as we contemplated when the war ceased, but at the same time it has been constantly with us. The trouble is that if one dealer re-

POINTS IN WEEK'S MARKETING NOTES

American Steel & Tin Plate Co. reports that last week was the largest booking in the history of the company.

Scrap metal prices have been marked up all around in Toronto markets, and there is a lot of buying and selling taking place.

That Germany will be in the market for copper and other metals is one of the reasons attributed for the higher prices quoted.

The oil industry is keeping many of the U. S. pipe mills running to capacity.

That the second-hand equipment idea still stands in the way of the sale of much new machinery is the statement of one well-known machinery dealer.

The demand for structurals is not much improved, while Pittsburgh reports state the demand for plates is wretchedly small in proportion to capacity. As a result there is still a tendency to shade plate prices, and it is stated that as low as 2.50 has been named for some orders.

fuses to take the used material another comes along who will do business on that line and seems anxious to. If there had been some understanding among the dealers on this point it would have saved a lot of trouble, but it has gone so far now that there is no chance of this. It is not bothering us any more than the rest of the trade, but at the same time we will be pleased enough when the war shop stuff and used equipment idea is a little more backed off than it is now and has been ever since the announcement came that the fighting had ceased."

The automobile business in Ontario continues to buy material. This is not only in the shops where cars are being made, but in repair shops as well. Many of the better garages are in the field, putting in a certain amount of equipment, and in many cases they have taken on machinery that saw some service in the war shops. This is a line of business that is bound to increase. One has only to stop and reckon the number of decent sized garages there are. There is a certain amount of equipment they can readily use, and they are showing a tendency to secure it.

Some slight improvement is noticed in supplies, although it must be said that the volume of business in this department is still light. Many of the shops around here that would, under ordinary circumstances, be large users, are still tied up by the strike, and the every-day wear and tear is absent, so it is that the

list of supplies called for for replacement purposes is small.

No Large Buying

Isolated cases are reported of fair-sized offers for plate, tubes and bars, but the buying can still be described as spotty rather than general. A dealer who does a lot of buying in the New York market, speaking to MACHINERY this week of conditions there, stated that he considered plate as the only weak spot in the market at present. He said that there had been a great increase in some districts of plate mill capacity in the war months, and it was a big undertaking now to book enough business to keep up to the capacity. In other lines the markets were particularly strong, and he bore out a statement that was made in these columns a few weeks ago that many of the concessions that had been given for some time past were being withdrawn by the mills, and that further some of the mills were now out of the market, being well filled with orders for some time.

Scrap Market Jumps

It has been months since there has been such a forward movement in the prices of what dealers will pay for material as is announced this week. Some weeks ago Montreal marked material well up, and this week Toronto has gone in the same direction. Some of the more noticeable increases are, of course, taking place in the coppers, which are very strong for the moment. In fact it is not possible just now to contract for fourth quarter under 26c. Light copper is marked up from 12 to 13½, crucible from 15 to 18. Similar increases are noticed in heavy copper and copper wire. Wrought iron axles are up \$5 per ton.

"What's the reason?" was the question that MACHINERY asked this morning when the new prices were announced.

"Reason enough," was the reply. "There is a much better feeling in the market, no matter how you look at it. There seems to be a conviction that things have definitely turned for the better. Business is good, and when we say that we mean just exactly what we say. We are both buying and selling in good volume. Foundries and mills in this country are taking on material more than for some time past. As far as the increases in copper are concerned there is a feeling that Germany will be in the market for a lot of this material, and there is no danger of her dominating the situation. The scrap metal market is better right now than it has been for a long time past," he concluded.

It is not generally known that an airplane camera weighs forty-four pounds, complete, and is made of aluminum throughout. The lens has a focal length of twenty inches, which means it can take a photograph from a great height without distortion. From 1-90th to 1-30th of a second is the usual exposure given the picture. The film roll is operated by a wind motor, and the film is long enough to take approximately 100 exposures.

PITTSBURGH REPORTS THAT IN SOME CASES AS LOW AS 2.50 IS PLATE PRICE

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., July 24.—There has been a slight increase in steel mill operations, taking the country as a whole, since the first of the month, when the rate was about 70 per cent. of capacity. That rate had represented a sharp increase, as the low point of the year in operation, about the middle of May, represented barely more than 50 per cent. of capacity.

There have been further gains this month in the volume of orders placed, but these gains are chiefly finished steel lines, upon which mills are already well sold up, and thus the increased buying results more in the piling up of tonnage on books for forward delivery than in an increase in the rate of production. This condition is particularly the case in lap weld pipe and in sheets, though it obtains to a limited extent also in merchant bars.

Unfinished and Finished Steel Capacity

As is fairly well understood in the trade an abnormal alignment exists as to capacity available for the production of steel and capacity for the refinishing of steel, from the ingot or bloom through to the merchantable products, bars, shapes, sheets, pipes, wire, etc. This arises from the steel making capacity having increased 40 per cent. since 1914, largely due to the demand for shell steel, while there was not corresponding expansion in finishing capacity, except in plates. Accordingly it would be difficult for the steel industry to work up to operating at capacity, on the basis of ingot capacity, which is used in figuring the percentages mentioned above, unless the orders for finished steel products were distributed to fit exactly the capacities in the different finishing departments. Some estimates are that with further expansion in demand between 85 and 90 per cent. of the steel making capacity can be utilized.

Mills that have an excess of steel producing capacity are, of course, considering the matter of adding finishing capacity to take care of the additional steel making capacity. The alternative to abandon some of the steel making capacity is altogether unthinkable. A case of this sort is that of the American Rolling Mill Co., Middletown, Ohio, which increased its steel making capacity very considerably during the war, and furnished large quantities of shell steel. This company has adopted plans for extensive additions to finishing capacity, and is now in the market for the requisite buildings, involving 3,200 tons of fabricated steel.

Heavy Bookings in Some Lines

For the last week for which the compilation is available, the American Sheet and Tin Plate Co. reports the largest bookings it has had for any week in its history, barring only one week in the fore part of last year. The compilation

refers not to contracts entered but to actual shipping orders entered, including specifications against contracts. The bookings were heavy in both sheets and tin plates. The National Tube Company booked in the first half of July a tonnage somewhat in excess of its entire capacity for a month. In both instances deliveries on most of the tonnage booked will be deferred weeks or months. In some sizes of lap weld pipe orders now entered cannot be shipped before November or December. Butt weld orders, on the other hand, can be filled promptly, and indeed are being filled to an extent from stocks accumulated earlier in the year.

The extremely heavy demand that has existed for months for line piping and other oil country goods is looked askance by some pipe mills as being due to an oil boom that cannot possibly continue indefinitely. It certainly seems strange that there should be so heavy a demand as to fill the lap weld departments of the pipe mills, when other users of lap weld pipe have been buying very sparingly indeed. The attitude is reflected in the failure of other pipe mills to follow the price advance announced early in the month by the Wheeling Steel & Iron Co., 2½ points on butt weld and 5 points on lap weld, about \$5 and \$10 per net ton respectively.

Demand Spreading

For several months past the condition as to steel demand has been that of certain lines of consumption being very active and others being very quiet, a natural enough situation when the country is recovering from war time conditions, as some lines of activity can return to normal sooner than others. For several months the leading lines in the matter of buying steel were the petroleum industry and the automobile trade. The sheet mills found a few months ago that they were receiving a moderate volume of business in the aggregate, equal, to say, 60 per cent. of capacity, but nearly all the tonnage was from the automobile trade. If their other customers had bought with corresponding freedom the mills would have been oversold. Now the sheet mills find their orders very much better distributed, as all their customers are buying with more or less freedom. In particular there is now a good demand for sheets involved in the building trades, as for instance for sheets for making metal lath.

A similar spread in demand is observed by the merchant bar mills. For a time the only branch of their business really active was represented by their cold drawn steel customers, who were fairly busy making material for the automobile and associated trades. Now, however, other customers of the bar mills have been coming into the market more freely, including the agricultural implement makers and machinery build-

ers generally, while there is a better demand for concrete reinforcing bars.

Demand for structural steel, however, still lags, although it is improving, and demand for plates is wretchedly small in proportion to capacity. Plate mills attached to pipe works have a fair volume of work in making plates for large pipe, and there has been an active demand from the oil trade, involved in tanks for oil storage and in small boilers for field work, the kind that can be rolled over the ground by a team to a point otherwise inaccessible. Most lines of plate consumption show decided inactivity, and even demand for shipbuilding is unsatisfactory as the shipyards are still drawing from accumulations. As a result of these conditions the regular or official price of plates, 2.65c, continues to be shaded very frequently, generally by \$3 a ton or to 2.50c, while other finished steel products show scarcely any deviations from the regular prices, those that became effective March 21.

Decline in Chain

While the producers of finished steel and the producers of most manufactured steel products, such as rivets, bolts and nuts, cold rolled steel, etc., have been doing team work and holding prices quite well, a disturbance has occurred in the chain trade. The American Chain Co., the largest producer, feeling that it was not getting the share of the total business to which it was entitled, recently made sweeping reductions in prices of ordinary or black chain, much to the surprise of other producers. They accepted the reductions, of course, but for a time considered the advisability of re-joining by making other reductions, as in bright chain, for instance, but this idea was abandoned. The reductions on black chain included a reduction in the base price, on one inch proof coil chain, from 6.50c to 6.75c, reductions also in most of the extras for size, and reductions in the extra for BB and BBB quality, whereby the average reduction on an assortment probably runs from \$25 to \$30 per net ton.

NEW YORK HEARS INCREASE LIKELY

Special to CANADIAN MACHINERY.

NEW YORK, July 24.—The machine-tool market is making gains in more ways than one. For instance, for some time past the great bulk of the buying has been done by one branch of the industry, viz., the automotive factories. They "came back" quickly as soon as the armistice was signed, and bought heavily. This was true not only of the existing shops, but of factories that were brought into existence after the signing of the armistice. In fact, the auto business has been kind to the machine-tool trade.

One of the best features to come to notice lately is that the buying of tools is becoming more general, and inquiries are coming from a much wider field than formerly.

One New York manufacturer has signed up a good-sized order of 42 large lathes for the Washington naval ordnance plant, the price being close to three-quarters of a million dollars.

French works have inquiries in the market here for equipment for the Creusot Works. It is stated that the erection of a very large steam turbine plant is contemplated.

Cincinnati tool builders, discussing

price prospects, state that an advance in some lines is far more likely to take place than a decrease. A shorter working day has been put in force at the old rate of wages. There is a scarcity in some of the shops of skilled labor. This works out in several ways. For instance, New England shops are getting a large amount of work that cannot be handled in the other centres.

FURNACES ARE NOT ANXIOUS TO BOOK ANY BUSINESS NOW FOR 1920

SOME very large tonnages of iron have been disposed of at the furnaces and prices show a firmer trend.

Pittsburgh.—The Carnegie Steel Co. has added two stacks, and have thirty-six in blast now, intending to add two more next week. By August 1 this company will have forty of its fifty-nine stacks active.

Boston.—Pig iron trading is dull. Fourth quarter prices look firmer. In spite of high freights southern iron is holding its own in the market here.

New York.—First half of 1920 is being covered now in many instances, and export business is a large factor in the dealings. Another furnace at Port Henry will blow in, about the end of July.

Buffalo.—Buyers are wanting iron now

where a few months ago they would not take it. Two big interests are out of the market now, showing no anxiety over quoting on 1920 business.

Cleveland.—Makers are now shipping more than their output, which is making a reduction in the stock they had piled.

Chicago.—Deliveries are complained of, and as users have bought short for some time, there may be yards where pig will be out or scarce.

Cincinnati.—Low-priced iron for third-quarter shipment is wholly absorbed. Southern stocks selling at \$25 have left the market.

St. Louis.—Furnaces are not trying hard to sell as they can readily dispose of their output. They are not booking for 1920 orders.

THE DEALERS HOLDING THEIR SCRAP* AND PRICES ARE CLIMBING AS RESULT

SCRAP metal users in Canada and the United States are coming into the market freely, and prices are stronger.

Chicago.—Scrap of all sorts goes up from 50c to \$2 per ton. Dealers are not keen on selling, expecting higher prices.

New York.—Yardmen and scrap collectors are holding back and forcing prices up. Tonnage moving is not large.

Boston.—Large sales are going to stove foundries. This is the best business in scrap metal which is otherwise rather dull.

Philadelphia.—Prices are mounting, but selling is small.

Pittsburgh.—Steel manufacturers are in the market in a large way. At one plant 28 cars were rejected as being below grade.

Buffalo.—Heavy melting is in demand, and dealers are not selling it in quantity. Good demand for all grades this week.

Cleveland.—An offer of \$21 delivered has been turned down for heavy melting. Dealers look for a shortage and higher prices as many yards are bare.

STANDARDIZATION OF CHAINS

The unprecedented demands of the Allied Governments for driving chains for all purposes during the period of the war, made it necessary for the British Driving Chain Manufacturers to collaborate in order to use the whole of their resources to the best advantage. As a result, the needs were met, both as regards quantity of production and quality of products. The benefits accruing from co-operation were so marked that a permanent association has now been formed.

The main object of the association is to foster and develop the use and application of chain gearing, the value of which is not yet fully appreciated by power users. In view of this, and in the face of competition with other forms of transmission, it is the policy of the association to keep down the cost of chain

driving to the user. This will be attained by:

1.—Standardization of chains wheels and chain wheel cutters to ensure interchangeability.

2.—Elimination of unnecessary sizes of chains, which have been a source of confusion and difficulty to the user.

3.—The increase in output resulting from the above.

4.—The more comprehensive research made possible by co-operation.

The association is composed of the following: Alfred Appleby Chain Co., Tilton Rd., Birmingham; Brampton Bros., Ltd., Oliver St. Works, Birmingham; "The Coventry" Chain Co., Ltd., Snon End Works, Coventry; Hans Renold, Ltd., Didsbury, Manchester.

GRAMMATICAL

Highlanders have the habit, when talking their English, such as it is, of interjecting the personal pronoun "he" when not required, such as "The King he has come," instead of "The King has come." Often, in consequence, a sentence or expression is rendered exceedingly ludicrous, as the sequel will show:

A gentleman of high standing tells us that he had the pleasure of listening to the sermons of an exceptionally clever divine (let his identity and locality remain a secret), and recently he began his discourse thus: "My friends, you will find the subject of my discourse this evening in the first Epistle General of the Apostle Peter, the fifth chapter and the eighth verse, in the words, 'The devil he goeth about like a roaring lion, seeking whom he may devour.' Now, my friends, with your leave, we will divide the subject of our text this evening into four heads. Firstly, we shall endeavor to ascertain 'Who the devil he was'; secondly, we will inquire into his geographical position, namely, 'Where the devil he was' and 'Where the devil he was going'; thirdly, and this of a somewhat personal character, 'Who the devil he was seeking'; and fourthly and lastly, we shall endeavor to solve a question which has never yet been solved, 'What the devil he was roaring about.'"

STORING LARGE QUANTITIES OF COAL

The problem of storing immense quantities of coal—10,000 tons or more—has always been a serious and expensive one. Railroads and power plants, and large industrial plants requiring coke, must always have large coal reserves. Many plants use the bucket and derrick method constantly to move the coal in order to prevent combustion and fire. This describes a method that has proved extremely successful.

The greatest danger connected with storing coal is in the slow combustion which takes place and is not detected until the odor of sulphuric fumes becomes noticeable. When this action begins the coal should be redistributed so that the pressure existing on the heating layer is removed. In some cases the entire coal pile would have to be turned over, since the greatest pressure is on the bottom, thus requiring quick action and the expenditure of a large sum of money. Any scheme whereby an increase of temperature in the coal pile can be detected, or by which it can be retarded or prevented, will therefore be a saving. To accomplish the first objective an electrical thermometer system was installed, with the temperature indicating instrument or pyrometer in the engineer's office. Switches were so arranged that the temperature of predetermined locations in the coal pile could be obtained almost instantly. The second objective was obtained by reducing the pressure on the heated layer, removing all the coal at that particular point if necessary. A temperature of 250 deg. F (120 deg.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	\$27 13
Lake Superior, charcoal, Chicago	\$4 60
Standard low phos., Philadelphia	29 35
Bessemer, Pittsburgh	25 75
Basic, Valley furnace	Toronto price:—
Silicon .225% to 2.75%	\$32.75 to \$35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	\$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bar, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	6 50
Chequered floor plate, ¼ in.	6 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill	2 35
Steel bars, Pittsburgh	2 65
Tank plates, Pittsburgh	2 45
Structural shapes, Pittsburgh	3 05
Steel hoops, Pittsburgh	4 50
F.O.B., Toronto Warehouse	3 62
F.O.B. Chicago Warehouse	3 72
Steel bars	3 90
Structural shapes	3 62
Plates	
Small shapes under 3'	

FREIGHT RATES

	Per 100 lbs.	C.L.	L.C.L.
Pittsburgh to Following Points			
Montreal	33	45	
St. John, N.B.	41½	55	
Halifax	49	64½	
Toronto	27	39	
Guelph	27	39	
London	27	39	
Windsor	27	39	
Winnipeg	89½	135	

METALS

	Per 100 lbs.	Grass
Lake copper	\$24 40	\$26 00
Electro copper	23 00	26 00
Castings, copper	23 00	24 50
Tin	55 00	54 00
Spelter	9 50	8 50
Lead	7 00	7 00
Antimony	9 50	9 50
Aluminum	36 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	\$ 4 50	\$ 4 50
Plates, 3-16 in.	4 90	4 90

Price List No. 38

WROUGHT PIPES

Standard Butt weld

	Per 100 feet	Per 100 feet
¼ in.	\$ 6 00	\$ 8 00
½ in.	4 68	6 81
¾ in.	4 68	6 81
1 in.	6 21	7 78
1¼ in.	7 82	9 95
1½ in.	11 56	14 71
2 in.	15 64	19 90
2½ in.	18 70	23 76
3 in.	25 16	32 01
3½ in.	40 37	51 19
4 in.	52 79	66 94
4½ in.	67 16	84 18

	4 in.	57	99	74
Standard Lapweld				
2 in.	38 81		35	34
2½ in.	42 12		52	36
3 in.	55 08		68	47
3½ in.	69 00		86	94
4 in.	81 75		103	00
4½ in.	93		1	18
5 in.	1 08		1	37
6 in.	1 40		1	78
7 in.	1 83		2	32
8L in.	1 93		2	44
8 in.	2 22		2	81
9 in.	2 66		3	36
10L in.	2 46		3	12
10 in.	3 17		4	02

Terms 2% 30 days, approved credit.
Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 60%.
4½" and larger 50%.
4" and under, running thread, 30%.
Standard couplings, 4" and under, 40%,
4½" and larger, 20%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds	Montreal	Toronto
Copper, light	\$13 50	\$13 75	
Copper, crucible	17 25	18 00	
Copper, heavy	17 50	18 00	
Copper wire	17 50	18 00	
No. 1 machine composition	13 50	16 75	
New brass cuttings	10 00	10 75	
Red brass cuttings	11 75	14 75	
Yellow brass turnings	8 50	9 00	
Light brass	7 00	7 00	
Medium brass	8 00	7 75	
Scrap zinc	5 50	6 00	
Heavy lead	5 00	5 25	
Tea lead	4 00	3 50	
Aluminum	16 00	18 00	
Heavy melting steel	12 00	13 50	
Shell turnings	7 00	6 00	
Boiler plate	12 00	11 00	
Axles (wrought iron)	17 00	20 00	
Rails	12 00	13 50	
Malleable scrap	15 00	17 00	
No. 1 machine cast iron	20 00	18 00	
Pipe wrought	9 00	5 00	
Car wheels	20 00	20 00	
Steel axles	20 00	20 00	
Mach. shop turnings	5 50	6 00	
Stove plate	15 00	13 00	
Cast boring	5 50	8 00	

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ¾" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	50
Elevator bolts	25
Machine bolts, 7-16 and over	40
Machine bolts, ¾" and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fl. hd., steel	10

Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fl. hd., brass	net
Nuts, square blank	add \$0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list less	15
Burrs only, list plus	25
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	\$8 50
Structural rivets, as above	8 40
Wood screws, O. & R., bright	75
Wood screws, flat, bright	77½
Wood screws, flat, brass	55
Wood screws, O. & R., brass	55½
Wood screws, flat, bronze	50
Wood screws, O. & R., bronze	47½

MILLED PRODUCTS

(Prices on unbroken packages)

	Per Cent.
Set screws	50
Sq. and Hex. Head Cap Screws	45
Rd. and Fil. Head Cap Screws	20
Flat But. Hd. Cap Screws	10
Fin. and emi-fin. nuts up to 1 in.	45
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	40
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	25
Studs	30
Taper pins	50
Coupling bolts	10
Planer head bolts, without fillet, list	10
Planer head bolts, with fillet, list plus 10 and	net
Planer head bolt nuts, same as finished nuts	
Planer bolt washers	net
Hollow set screws	net
Collar screws	list plus 20, 30
Thumb screws	40
Thumb nuts	75
Patch bolts	add 20
Cold pressed nuts to 1½ in.	add \$1 00
Cold pressed nuts over 1½ in.	add 2 00

BILLETS

	Per gross to
Bessemer billets	\$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	\$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ¾ in. and larger	\$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	ne
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MISCELLANEOUS

Solder, strictly	\$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll ...	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 10
Linseed oil, raw, single bbls. ..	1 70
Linseed oil, boiled, single bbls. ..	1 73
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth.	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular.	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

S.S. drills, wire sies up to 52	40
S.S. drills, wire sizes, No. 53 to 80	40 plus 10
Standard drills, al sizes ...	40 plus 10
3-fluted drills, plus	10
Jobbers' and letter sizes ..	40 plus 10
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills.	25
Electricians' bits	30
Sockets	50
Sleeves	50
Taper pin reamers	net
Drills and countersinks. list plus	10
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus 20 to 50	
Canadian high speed cutters	net
American	plus 40

COLD ROLLED SHAFTING

At mill	list plus 5%
At warehouse	list plus 25%
Discounts off new list. Warehouse price	

at Montreal and Toronto IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15½c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

Sheets, black, No. 28.	Montreal \$ 6 55	Toronto \$ 6 00
Sheets, black, No. 10.	5 15	5 45
Canada plates, dull, 52 sheets	8 50	7 10
Can. plates, all bright.	8 50	8 00
Apollo brand, 10¼ oz. galvanized		
Queen's Head, 28 B.W.G.		
Fleur-de-Lis, 28 B.W.G.		
Gorbal's Best, No. 28.		
Colborne Crown, No. 28		
Premier, No. 28 U.S.	7 50	
Premier, 10¼ oz.	7 80	
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

(Warehouse Price)

B

¼ in., \$13.50; 5-16, \$11.50; ¾ in.,

\$10.50; 7-16 in., \$9.30; ½ in., \$10.15; \$13.00; ⅞ in., \$9.60; ¾ in., \$9.70; ⅝ in., \$9.95; 1 in., \$9.50; Extra for B.B. Chain, \$1.20; Extra for B.B.B. Chain, \$1.80.

ELECTRIC WELD COIL CHAIN B.B.
¼ in., \$16.75; 3-16 in., \$15.40; ¼ in., \$14.20; 5-16 in., \$11.50; ¾ in., \$10.50; 7-16 in., \$9.30; ½ in., \$10.50; ⅝ in., \$10.00; ¾ in., \$9.70.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	\$25 00	\$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in. ....	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb. ....	.....
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.0	06
Lard oil, per gal.	\$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double.	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	\$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck.	2 00
Emery in kegs, American.	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive .....	.08½
Grits, 80 and finer .....	.06

BRASS—Warehouse Price

Brass rods, base ½ in. to 1 in. rod 0 34

Brass sheets, 24 gauge and heavier, base\$0 42
Brass tubing, seamless 0 46
Copper tubing, seamless 0 48

WASTE

XXX Extra. ....19½	Atlas .....17
Peerless .....19	X Empire ...15½
Grand .....18	Ideal .....16
Superior ....18	X Press .....14
X L C R ....17	

Colored

Lion .....15	Popular .....12
Standard .....13½	Keen .....10½
No. 1 .....13½	

Wool Packing

Arrow .....25	Anvil .....15
Axle .....20	Anchor .....11

Washed Wipers

Select White.11	Dark colored.09
Mixed colored.10	

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades... 15%

ANODES

Nickel .....	.58 to .65
Copper .....	.38 to .45
Tin .....	.70 to .70
Zinc .....	.18 to .18

Prices per lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	\$42 50	\$43 00
Copper wire, list plus 10.		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	\$10 25	\$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50
Cut sheets, ½c per lb. extra.		
Cut sheets to size, 1c per lb. extra.		

PLATING CHEMICALS.

Acid, boracic	\$.25
Acid, hydrochloric .....	.06
Acid, nitric .....	.14
Acid, sulphuric .....	.06
Ammonia, aqua .....	.23
Ammonium carbonate .....	...
Ammonium chloride .....	.55
Ammonium hydrosulphuret ....	.30
Ammonium sulphate .....	.15
Arsenic, white .....	.27
Copper, carbonate, annhy .....	.50
Copper, sulphate .....	.22
Cobalt, sulphate .....	.20
Iron perchloride .....	.40
Lead acetate .....	.35
Nickel ammonium sulphate .....	.25
Nickel carbonate .....	.32
Nickel sulphate .....	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite .....	.15
Sodium carbonate crystals .....	.05
Sodium cyanide, 127-130% ....	.40
Sodium hydrate .....	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate .....	.18
Tin chloride	1.75
Zinc chloride, C.P. ....	.80
Zinc sulphate .....	.15

Prices per lb. unless otherwise stated.

C.) was assumed to be the safe internal temperature; if the pyrometer showed a close approach to this figure, the coal at this point was immediately removed to the point nearest the place of consumption. This involved little additional expense in operating costs, as the coal would eventually find its way there anyway. This is not true of the "turn-the-coal-over" method, especially if the storage place is limited.

To keep within the safe temperature limits the coal, as consumed, was removed from the top in two-foot layers with a gradual slope toward the point of consumption. The removal of the two feet of coal reduced the lowest layer from the pressure of the removed weight, and the gradual slope made the work of the men with loaded wheelbarrows less than if a perfect level was retained.

Ten thousand tons of coal piled 12 ft. high meant that a ground area of 33,350 square feet would be required, assuming a value of 50 lb. per cubic foot. A trackage of 400 feet permitted the unloading of coal on a plot 350 by 100 feet. For satisfactory detection of heat changes in the coal to be stored on this plot it was decided to place pyrod receptacles (thermocouples) in rows of fifteen. The receptacles were constructed of 1-inch wrought-iron pipe, welded to a point at the end, which entered the coal pile. The exposed end was fitted with a self-closing cap to prevent the entrance of any substance which might interfere with the ready insertion of the pyrods. Fifteen pyrods were used. The wiring to the engineer's office, however, was of a permanent nature from a central location on the coal pile. From this point lines radiated to the portable pyrods.

The pyrod receptacles were numbered 1 to 15 on each row, which had a distinguishing letter. The switches in the engineer's office were numbered and lettered in a manner to correspond with the pyrod receptacles. This plan permitted an attendant to place the pyrods in the desired receptacles, and the engineer to observe and record in the station log, in numerical order, the temperature readings of the coal at the different points. After placing the last of the pyrods in row "A," the attendant immediately commenced transferring them to row "B" in numerical sequence. The time was considered sufficient for the pyrod to adjust itself to the various temperatures encountered, inasmuch as the temperature to be measured already existed in the pockets formed by the pyrod receptacles. Thus an unbroken operation can be carried out in the shortest possible period of time. After the temperature existing in the last pyrod receptacle was read all the pyrods were transferred to centrally located receptacles, as it was assumed that this would be in the vicinity of the greatest possible heat generation, inasmuch as they are the farthest removed from the cooling effect of the air.

CONFERENCE ON LIMIT GAUGES

By H. J.

A conference on the question of limit gauges for general engineering work was held recently by the British Engineering Standards Association at the Institution of Civil Engineers, at which Sir Richard Glazebrook presided. The paramount necessity from a national point of view of a standard system of such gauges for general engineering work has been emphasized by the experience of the war. The immense amount of interchangeable parts required, owing to the abnormal demands made during the war, has brought this question very much into prominence. With the return of peace, it is realized that competition will be very strenuous. Repetition work is absolutely necessary, and if the manufacturers of the country can be persuaded to adopt a system of limit gauging, not only will the character of their work be improved, but their output will be increased. About fifty people were present, chiefly manufacturing engineers.

Two important points were brought out during the discussion; in fact, they were thought by some of those present to strike the keynote of the situation. One laid stress on the necessity for publicity and educational work, and the other emphasized the importance of securing that any system recommended should be a development of and not incompatible with, the systems at present in use in the various factories. This latter point, it was felt, would need careful investigation, there being little definite knowledge as to the number of firms throughout the country using systems which would be affected by a new scheme.

The chairman stated that the conference had been called together to gain some general idea of the views of the manufacturers as to the principles which should, in their opinion, underlie a system of limit gauging for general engineering work; to learn their own experience, and to discover by means of a properly organized investigation into the subject how far they consider it would be possible to co-ordinate existing practices so as to evolve a standard system which could be used satisfactorily by all concerned.

The meeting discussed at length the following points. A general expression of opinion was asked for in each case, not as constituting a definite decision, but rather as affording some indication as to the trend of opinion in regard to the main points at issue: (1) Should the hole or the shaft be taken as the basis. It was agreed that the hole should be the basis; (2) Disposition of limits. Two main proposals were discussed: (1) That the mean dimension of the hole should be its nominal size, the tolerances being both positive and negative; (2) That the minimum dimension of the hole should be the nominal size, the tolerances being positive. Apart from theoretical considerations, the choice of the mean size as the nominal was urged for the reason that as this system was already employed in the principal existing systems, it would be more likely to gain a general adoption than would the other. The vot-

ing, however, out of forty-six present, showed twenty-three in favor of taking the minimum hole as standard, as against sixteen in favor of taking the mean.

Qualities of Work

(3) The general feeling was that four or five qualities of work would be sufficient, qualities of work being taken to mean degrees of fineness of tolerance. Some present considered more to be necessary, others thought three sufficient.

Classes of Fit

(4) It was agreed that the following three classes of fit would be needed, i.e., running fits, transition fits, and interference fits. It was emphasized, however, that it would not be necessary to arrange for all the qualities of work in each class of fit.

Allowances

(5) The question as to whether the basis of the system should be the minimum or mean allowance in the case both of running and obstruction fits received considerable attention, and was left for more detailed consideration. As regards the basis for laying down tolerances and allowances for running and transition fits, it was agreed that further experimental work was needed before this could be finally settled, but the feeling was expressed that the formula:

$$\text{Allowance} = a + b\sqrt{D}$$

a and b being suitable constants and D the diameter, might be accepted provisionally. In applying such a law the tolerance would naturally increase by a series of steps, its amount being constant over a given range of diameter and increasing by some definite step at the end of the range. It was generally agreed that for most qualities of work the steps should be limited to multiples of two or four ten-thousandths of an inch, while not excluding multiples of one ten-thousandth in the finer qualities of work, and the ranges formed by the series .1, .2, .3, .4, for an inch were thought to be suitable for running and transition fits. It was thought that interference or obstruction fits should increase proportionally to the diameter.

Procedure

(6) The question has hitherto been considered by a sub-committee of the sectional committee on machine parts, their gauging and nomenclature, and at the close of the conference the meeting was asked as to whether it considered it would be desirable for a larger and more representative committee to be formed for the sub-committee to report to in order to obtain the widest publicity possible for the work and the fullest measure of support for the recommendations when issued. It was agreed that such a course would be beneficial as safeguarding all interests, and a scheme by which, pending the formation of this sectional committee, the present sub-committee should be reorganized with the addition of a number of manufacturing engineers, and given the power to appoint panel or small committees of experts to commence the detailed work, has now been sanctioned by the main committee of the association, and is being put into operation.

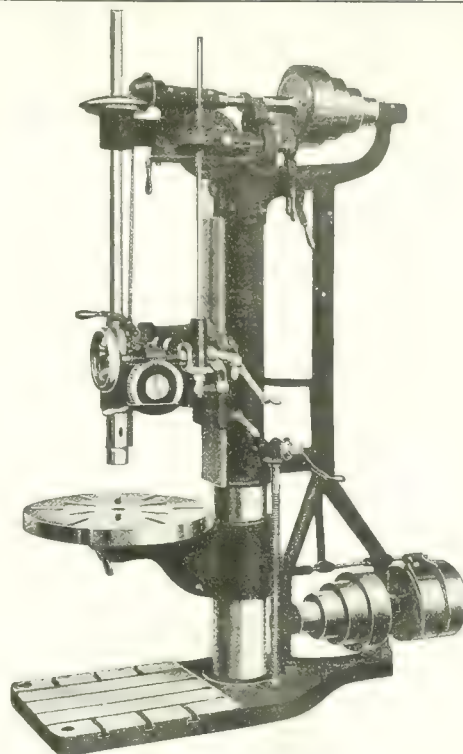
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Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

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1

MORROW

NUTS

MORROW



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES



TRADE GOSSIP

The J. C. Wilson Mfg. Co., Ltd., Belleville, Ont., is in the market for a 6 to 8-ft. vertical boring mill.

Brickmaking in Manchuria.—In Kaiuan, Manchuria, a company has recently been organized with a capital of \$50,000, to manufacture bricks.

Substation Expands.—The Toronto Hydro-Electric Commission has purchased the property at 27 and 29 Nelson Street, for the purpose of extending the substation at Duncan Street.

Saw Mill Burns.—The saw mill of Mr. Musclow, situated at Musclow, North Hastings, was completely destroyed by fire recently. The loss is a total one and is not covered by insurance.

New Brantford Shop.—The Allied Aeroplanes, Ltd., Brantford, Ont., has been incorporated with a capital stock of \$40,000 by John Dowling, Brantford, Ont.; Bryan Dowling and others of Toronto, to manufacture aeroplanes, engines, etc.

To Spend Large Sum.—The expenditure of a sum of \$2,500,000 is contemplated by the Beaver Wood Fibre Company in the expansion of the Thorold plant, as well as building a duplicate of the Ottawa plant to take care of the increased Canadian and export business.

The Newmarket Explosion.—The inquest on the victims of the explosion at the factory of Wm. Cane & Sons, Newmarket, has been postponed until July 25th next to allow of the experts making a thorough analysis of the water used in the boilers, which is supposed to have been responsible for the accident.

Increasing Yard Area.—The large farm of A. Weaver, on the Niagara River frontier, nine miles from the International Bridge, has been secured by a party of Toronto realty dealers. It is understood that the ground will be used for extending the yard holdings of the Canadian Niagara Bridge Company.

To be Completed.—By August 1 it is expected that the contractors will be able to hand over the St. John Valley Railway to the Dominion Government, to be operated as part of the Canadian National Railways. Hon. W. F. Jones, president of the St. John & Quebec Railway Company, has made this announcement.

New Machine Shop.—Contracts have been let by the Lang Manufacturing Co., of Guelph, for the erection of a new machine shop to be built on the Harris St.

side of their present factory. This is necessary owing to the expansion of their business, which is increasing at a rapid pace. The firm, which conducts a general machine shop business, purpose taking up other lines when they have the new premises available.

Embargo on Freight.—The United States Railroad Administration has issued orders for an embargo on all coastwise freight traffic, due to the congestion caused by the marine strike. Much perishable freight is already piled up at Atlantic and Gulf ports, and the secretary of the Seamen's Union claims that the entire shipping of the country will be tied up within the next two weeks if a settlement is not reached.

Contract Let.—The General Motors of Canada, Ltd., has awarded the general contract for a factory at Oshawa, Ont., to cost \$1,000,000 to the Canadian Stewart Co., foot of Cherry street, Toronto. It will consist of an assembling building, four stories, 40 x 80 ft., of reinforced concrete; shipping building, 80 x 200 ft.; storage building, four stories, 80 x 800 ft.; enameling building, 80 x 300 ft., three stories.

New Industry for Miramichi.—Mr. H. W. Mobbs of Kettering, England, president of the largest last company in the United Kingdom, is looking into the prospect of starting a last-making industry on the Miramichi. If they can get the stumpage at reasonable rates they propose to establish mills to handle 3,000,000 feet of lumber. This would be sawn, shaped and seasoned, leaving only the final operations to be done in England. The lumber required is rock maple.

Trade With New Zealand.—Mr. Beddoe, trade commissioner for Canada in New Zealand, who is on a visit here, gave some illuminating figures on the development of trade in the last few years. Since 1900 the exports from Canada to New Zealand have increased from 150,000 pounds sterling to 1,000,000 pounds a year. The exports from New Zealand have grown from 100,000 pounds to over 1,000,000 pounds sterling. Mr. Beddoe is here with the object of familiarizing himself with conditions in Canada after the war.

To Try New Boilers.—In order to try out the Spencer heating boilers equipped with self-feeding furnaces, which have been successful in Hamilton schools, the Board of Education of Toronto departed from their usual rule of accepting the lowest tender. The difference in the

bids was as follows: Tubular boilers, \$12,300; brickwork, \$6,100. Spencer boilers, \$15,500; brickwork, \$7,375. The installation in Toronto will be in Howard Park School.

Imports Decrease.—Trade returns for the three months ending June 30th, show a great decrease in imports compared to the corresponding three months last year. The total value of imports last year was \$250,527,808, while the value for this year was only \$200,615,514, the decrease being \$49,912,294. Domestic exports for the three months this year were \$244,096,793, and for last year \$258,673,479, a decrease of \$14,576,681. The trade as a whole decreased by \$59,108,602, the figures for this year being \$455,746,463, and in 1918, \$514,746,065.

Beating Great Britain.—The fact of large orders going to Canada and the United States from the South African Government, was the cause of enquiry in the British House of Commons by Mr. R. P. Houston, member for Liverpool. These orders were for 44,000 tons of rails, 1,000 cars, 250 trucks, and 70 locomotives. The Colonial Under Secretary in reply stated that some of the orders had been placed prior to the signing of the armistice, when Great Britain was not in a position to supply railway material. British prices and dates of delivery on the locomotives were unsuitable.

MARINE

Buffalo.—Several of the crews of ships leaving the Great Lakes for European waters are refusing to sign for any further distance than Montreal, owing to the strike of shipworkers on the Atlantic coast.

C.P.R. Ordered to Start.—The Canadian Pacific Railway Co. has been ordered by the Dominion Railway Board to begin the construction of its new terminals at Kingston not later than May 20, 1920.

Montreal.—The "Canadian Volunteer," the first of the Government vessels to make the trip from Vancouver to the United Kingdom, will soon be followed by the "Canadian Trooper." The Wallace Shipyards expect to deliver this vessel about August 7.

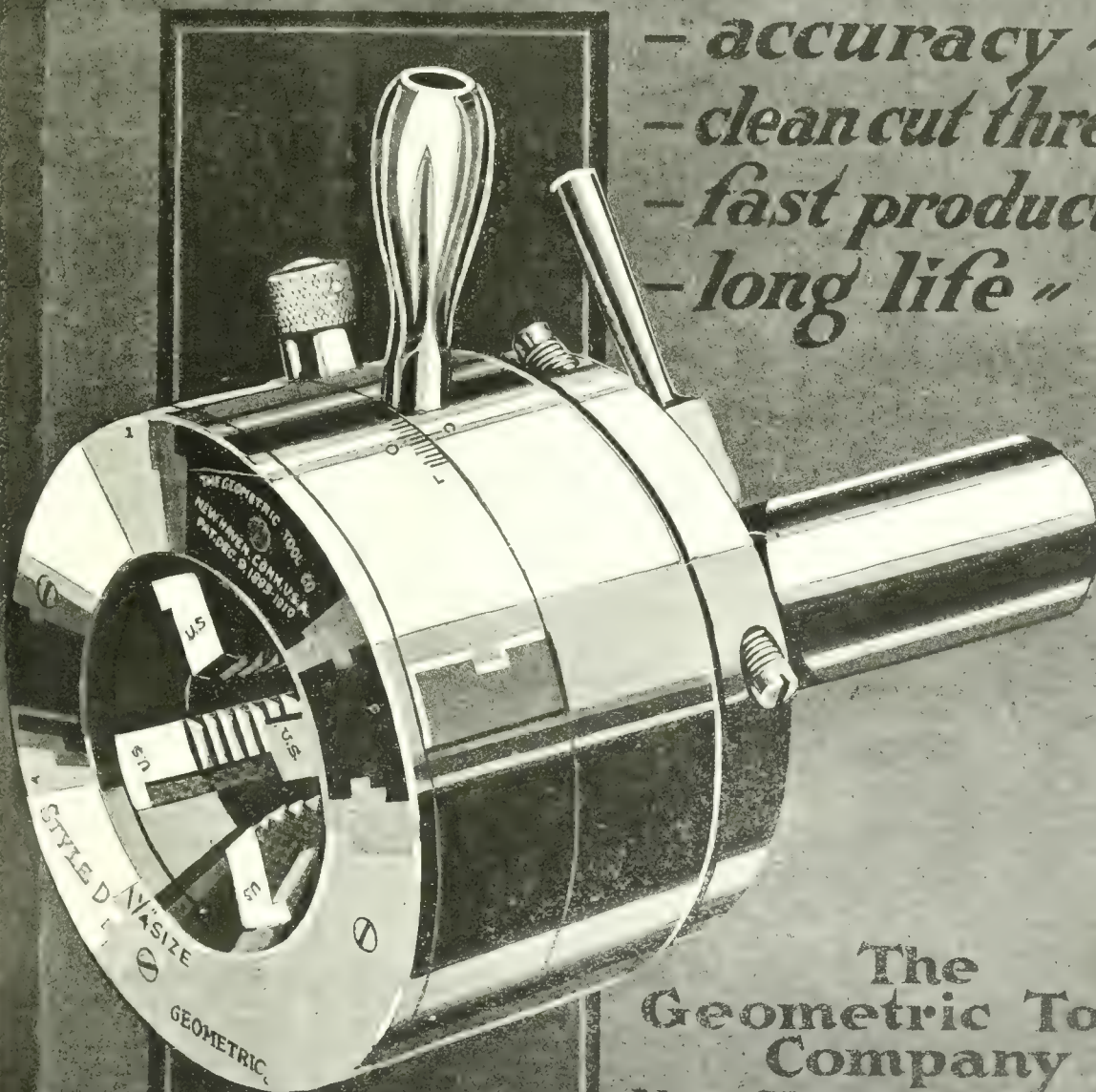
Lumber Price Investigation.—The contractors in the district of Calgary have been notified by Premier Sir Robert Borden that their demand for an investigation into the price of lumber will receive his immediate attention. An en-

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quary into the price of linseed oil and paint is also demanded.

Vancouver.—The last of the Lyall ships will have been probably launched by the 22nd July, and no further vessels are expected to be built in the yards. The total tonnage of wooden vessels constructed amounts to 37,800 tons, some of which is at sea and some still at the fitting out wharves. Six of the ships were for the Imperial Munitions Board.

London.—The Shipping Engineering and Machinery Exhibition that will be open in September will afford the public an opportunity to see the luxury and ease of sea travel. Everything of interest from a marine engineering standpoint will also be on view, and there will be no exhibits of enemy origin in the exhibition.

St. Johns.—High freights offering to Buenos Ayres and other southern points have denuded the market of steamer offerings, but there are plenty of sailing vessels. They are getting from 345 shillings to 350 shillings for transatlantic cargoes per standard. Lumber mills are all busy, with good prospects for future business.

St. Thomas.—Negotiations are going forward between the St. Thomas Board of Trade and representatives of the Cleveland Transportation Company with a view to the resumption of the service between Port Stanley and Cleveland. This was discontinued during the war on account of the restrictions on the higher expenses. It is hoped to start the service at the end of July.

New York.—According to a statement by the American Steamship Association no strike-breakers will be employed to man ships affected by the marine strike, the association stating that they prefer to let the ships remain idle. The strikers say that if an agreement is not speedily reached they will appeal to seamen's labor organizations in Great Britain to take similar action.

Cleveland.—The freight situation is quiet. There is not much grain movement and tonnage is freely offered for ore. Small carriers and line boats are taking all the grain that is offering. Sales have been light in the ore trade but a better buying movement is looked for by the end of the month. The movement of coal from the Pittsburgh district is also light and vessels have frequently to call at two ports to make their full cargo.

New Westminster.—The Poplar Island Shipyard of the New Westminster Construction Company has been permanently closed down as far as the company is concerned. The company are outfitting the remaining French vessels, but they have no more building contracts in sight, and they are selling out all their equipment. The opinion of Mr. H. M. Fullerton, the secretary-treasurer of the

company, is that the wooden shipbuilding business is done.

Chair Works Changes Hands.—The Canada Last Co., of Toronto, has purchased the works of the Preston Chair Co. from the corporation of Galt. The company went into liquidation, owing the municipality the sum of \$19,153, and the price paid the corporation by the Canada Last Co. was \$21,000, which clears the town of any loss. The new owners will spend a considerable sum in improving the property, and will employ from 40 to 50 hands.

Ashtabula.—The coal steamer, "Dundurn" was lost by foundering near the breakwater at Ashtabula, Ohio, in a heavy storm. The "Dundurn," which was owned by the Canada Steamship Lines, was 186 feet long by 30 feet beam, and 12 feet deep, and was well known on the lakes. She was on the Hamilton to Montreal trade under the late Capt. Cooney for some years. Two of the crew were drowned when the vessel went under.

Boston.—The steamer "Governor Cobb," Boston to Yarmouth, N.S., went aground on Green Island in a thick fog. She had 500 passengers aboard. She floated on the flood tide and proceeded to Yarmouth under her own steam. Green Island is three miles east, nine degrees north of Gannet Rock, and nine miles due south of Yarmouth, and is a small rock about 50 feet high. It is surrounded by detached rocks, and on the south side ledges stretch out to sea for about half a mile. The remaining shores of the island are very steep.

Canadian War Inventions.—There is a department at Argyll House, London, which has been instituted to deal with Canadian war inventions. A large number of devices have been submitted, of which a fair proportion were found to be of practical utility. Chief among these may be mentioned the following: Improvement to gas masks, of which about three million were manufactured, by Lieut. C. Rosling, C.E.; Lewis magazine loader and improvements to Colt machine gun, invented by Major H. R. Northover, M.C.O.B.E., both of which were used, and a bomb dropper invented by Lieut. Col. W. F. Kemp, D.S.O. The inventions cover appliances all the way from a combination turf cutter and conveyor to an auxiliary field kitchen.

PERSONAL

Mr. W. B. Roberts, who has just returned from England where he held the rank of Lieut. Commander (Engr.) in the Royal Navy, has been appointed chief inspector for Saskatchewan and Alberta, for the General Accident Insurance Co., boiler department. Mr. Roberts, before going overseas, represented the company in that territory for about two years. He was connected with the Manchester

Steam Users' Association for a period of five years, where his opportunities to obtain expert knowledge of boiler questions was unlimited. Besides his naval experience, he was in the mercantile marine for some years, and holds the extra first-class certificate of the British B. of T. He should be a great acquisition to the engineering fraternity of the prairie provinces.

INCORPORATIONS

The **Chas. H. Russel Co., Ltd.**, has been incorporated with a capital stock of \$20,000, divided into 200 shares of \$100 each, with head offices at Montreal, to carry on a general lumber business.

The **Maritime Paper Co., Ltd.**, with head offices in Moncton, N.B., has been incorporated to carry on a general paper manufacturing business. The capital stock will be \$100,000, divided into 1,000 shares of \$100 each.

Hugh Doheny & Co., Ltd., have been incorporated with a capital stock of \$2,000,000, divided into 20,000 shares of \$100 each, and head offices in Montreal, to carry on the business of general contractors and engineers.

The **United Portland Cement Co., Ltd.**, has been incorporated with head offices at the town of Brantford, to manufacture and sell Portland Cement. The stock of the company is \$200,000, divided into 2,000 shares of \$100 each.

The **Chase Tractors Corporation, Ltd.**, has been organized with a capital of \$2,000,000, divided into 20,000 shares of \$100 each, with head offices in Toronto, to carry on the business of steel founders, mechanical engineers and general manufacturers.

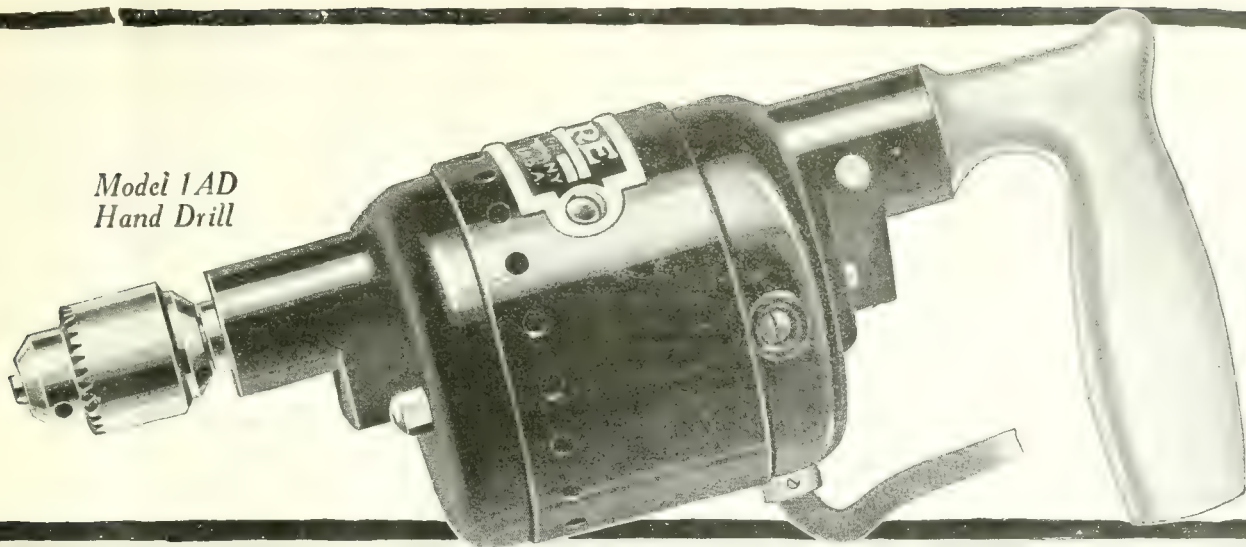
H. Corke & Co., Ltd., have been incorporated with a capital stock of \$100,000, divided into 400 shares of \$25 each, to carry on the business now carried on by H. Corke & Co., Georgetown, manufacturing woollens and cottons.

The **Battery Engineering and Supply Co., Ltd.**, with head offices in Ottawa, has been incorporated with a capital stock of \$50,000, divided into 500 shares of \$100 each. The company will manufacture all kinds of electrical appliances and automobile engines.

The **Continental Storage Battery Co., Ltd.**, has been incorporated with a capital stock of \$50,000, divided into 500 shares of \$100 each, the head office being in Ottawa. The object of the company will be to make and sell batteries, and deal in automobiles and supplies generally.

The **International Coal and Coke Co.** has been incorporated with a capital stock of \$3,000,000, divided into three million shares of \$1 each, with headquarters in Coleman, Alta. The company will do a general business in coal

*Model 1AD
Hand Drill*



MODEL 1AD Hand Drill

Length—10 inches.

Weight—4 $\frac{3}{4}$ pounds.

Capacity—Steel, brass, aluminum and alloys, 0 to $\frac{1}{16}$ inches.

Motor—Universal, operates on either direct or alternating current. Diameter of motor 3 $\frac{3}{8}$ inches.

Spindle—Offset from center $\frac{25}{32}$ inches.

Drive—Helical gears.

Handle—Aluminum. Complete with 10 foot cord, plug, switch and chuck. Jacobs chucks used as regular equipment.

MODEL 2AD Sensitive Drill

Height—18 ins. **Weight** 18 lbs.

Stroke—3 $\frac{1}{4}$ ins. **Feed**—Rack and pinion. Helical gear drive.

Capacity—Steel, brass aluminum and alloys, 0 to $\frac{3}{16}$ inch. Drills to center of 7 $\frac{1}{2}$ inch piece.

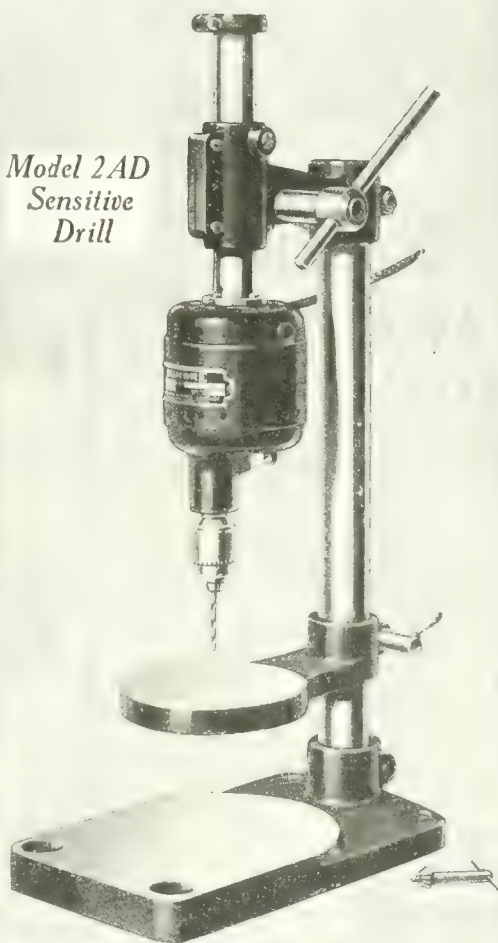
Motor—Universal, operates on either direct or alternating current. **Diameter**—3 $\frac{3}{8}$ inches.

Spindle—Offset from center $\frac{25}{32}$ inches.

Thrust—Ball bearing.

Table—Adjustable, may be raised, lowered or swung entirely out of the way. Complete with 10 foot cord, plug, switch and chuck. Jacobs chucks used as regular equipment.

*Model 2AD
Sensitive
Drill*



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and oil lands, coal, coke and oil, and general mining operations.

The Automatic Gauge and Supply Co., Ltd., has been incorporated with a capital stock of \$100,000, divided into 1,000 shares of \$100 each, with head offices in Montreal, the object of the company being to carry on a general automobile business, and especially to exploit a patent gasoline indicator.

WAGES OF SHEET AND TIN MILL WORKERS REDUCED

Youngstown, Ohio.—Sheet and tin mill operatives will sustain another wage reduction during July and August as a result of the bi-monthly examination of selected sales sheets in this city July 12. The average price of Nos. 26,

27 and 28 gage black sheets shipped by the mills in May and June was found to be \$4.35 per 100 lb. This will effect a reduction of 4½ per cent. in the wages of sheet mill hands, as compared with the rate in May and June. At the May settlement the average price of black sheets of 26, 27 and 28 gage was \$4.50, and the latest examination discloses therefore a reduction of 15c per 100 lb.

The average price on shipments of tin plate per base box during May and June was \$6.90, as against \$7.15 for March and April. This reduction of 25c per base box means a reduction of five per cent., for tin mill workers. During the Atlantic City conference to establish an

annual wage scale, which fixes a basis for the bi-monthly settlements, the sheet mill crew, except the roller, heater, rougher and shearsman, received an advance on the base rate of from 5 to 10 per cent. The reduction of 4½ per cent. is therefore a full loss for the higher paid men and takes away for the two-month period about half the increase granted those lower paid.

This is the third wage cut this year in both sheet and tin divisions, the first one coming at the March settlement, when sheet operatives were cut 10½ per cent. and tin mill hands 8 per cent. At that time, the settlement was based on an average selling price of \$4.90 for sheets and \$7.45 for tin plate.

FURNACES INSTALLED

The Electric Furnace Co., of Alliance, Ohio, has just installed a battery of two Bailly Electric Furnaces at the Capital Brass Works, Detroit, Mich. These furnaces are the standard 105 k.w. tilting type, with hearth capacities of 1,500 pounds each. They will be used for melting yellow brass scrap and borings in the foundry.

The Buick Motor Co., Flint, Mich., has just purchased a second Bailly Electric Furnace for melting phosphor bronze. The furnace is of the tilting type, rated at 1,500 pounds hearth capacity, and an electrical capacity of 105 k.w.

The Akron Bronze and Aluminum Co., Akron, Ohio, has installed a 50 k.w. rectangular tilting type Bailly Electric Furnace in its jobbing foundry. This furnace has a hearth capacity of 300 to 500 pounds and will be used for a wide variety of compositions. Heats will range from 100 to 500 pounds, and will include gun metal, phosphor bronze, red and yellow brass.

Surplus In United States Has Been Disposed of In Short Order

The U. S. Government surplus of copper, which producers agreed to market within 15 months, has all been sold, only three months being required to accomplish the task. Originally placed at 140,000,000 pounds, the Government holdings were actually less than 100,000,000 pounds and practically every one of the leading producers took a proportionate part to work in with his own sales.

May Purchase Towers.—It is reported that the Nova Scotia Steel and Coal Company have started negotiations for the purchase of the coaling towers at the Halifax terminals, now the property of the British Ministry of Shipping, and also for the purchase of a large supply of coal now on the piers.

New Quarters.—The International Machinery and Supply Company have acquired a four storey building at 421 St. James Street, Montreal, and in a short time will remove from their present office. The new building will have a floor space of about 7,000 square feet, and in addition to their present activities the firm will start an electrical department. R. J. Hiller will be the manager of the new department.

Upon the Health of your employees depends your profit and production



Don't be contented with half-way goodness or makeshift drinking arrangements.

Throw out the germ-laden Drinking Cup!

Give your men a clean drink

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Allows just the proper amount of cool, clean fresh water to come through the bubbler. No spurting, overflowing, no loss. "Puro" regulates itself. "Puro" saves 35% on water bills too. You can attach it in a few minutes. Tell us how many men, how many departments and we'll tell you how much the cost will be.



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STEEL
OF EVERY DESCRIPTION
SEND US YOUR ENQUIRIES.

TO ENLARGE STEEL PLANT

It has been decided by the Lake Superior Corporation to begin work immediately on an extension of the rail mill of the Algoma Steel Co.'s plant at Sault Ste. Marie, Ont.

The purpose of the extension is to make possible the production of structural steel up to 23 inches. Work will be begun at once, and the extension will cost several hundred thousand dollars. It is expected to be completed by November. It has been stated that this is but the first step in a considerable development of the plant, with a view to further caring for the Canadian market for this form of steel product, and that the ultimate scheme will be on a large scale. The present extension is not made with any understanding with the Dominion Government, but is said to be based on the expectations of the market for Canadian produced steel, which is expected to extend on a large scale. The rail mill of the Algoma Steel Co. is now running at about 46 per cent. capacity, and the other portions of the steel plant are going at about full capacity.

Open Toronto Office.—An uptown office was opened recently in 303 Royal Bank building, Toronto, by the Cataract Refining Co., of Buffalo. The warehouse of the company is on the Don esplanade. Mr. F. M. Deer is in charge of the new office, and plans are being made to still more thoroughly cover the Canadian market by the company's representatives.

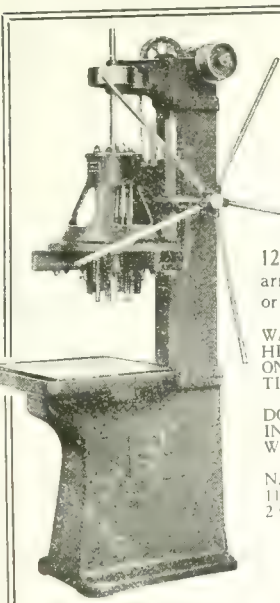
Grant for Smelter.—A delegation waited on Premier Oliver of British Columbia with a request for a loan of \$300,000 for the purpose of establishing a Rotherd electric smelting plant in the province. The deputation was headed by Mayor Vance, of North Vancouver, and Reeve Fletcher, of Point Grey. Samples of steel were shown to the Ministers, and they were informed that the high grade exhibits had been made from the ore in the space of four hours. The delegation were promised that a full investigation would be made into the project by the Minister of Mines.

ENGINEERING

Sold Equipment.—The Beaver Engineering Company of Montreal have disposed of nearly all their equipment and will shortly be out of business.

Montreal.—Further developments of the water powers of the St. Maurice River is being considered by the St. Maurice Paper Company. It is understood that the company has leased two sites on the river known as Les Forges and La Gabelle, and it is intended to combine these two, which will give a head of 23 feet, and increase the power now available about 40,000 horsepower.

Extensive preparations are now under way for the Jacques Cartier centennial to be held next month in Montreal. This



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celebration will last for eight days, from August 9th to the 17th inclusive. An industrial fair will be held in connection with the event and to this end exhibition stalls are now being erected on Fletcher's Field, where the main festivities will take place. It is anticipated that the Prince of Wales will unveil the monument during his visit to the city.

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COLLAPSIBLE TAPS AND DIES. NEW. AT one-third of cost price. Two 3 $\frac{3}{4}$ " McMurchy Standard Machine Taps; three 2" McMurchy Standard Machine Taps; one 2" McMurchy Style C Geometric Die Hand; one 2 $\frac{1}{2}$ " Geometric Tool Company Die Head. Complete with new H.S. Chasers. E. A. Lowry Power Equipment Company, Guelph. (c4m)

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Tenders will be received by the undersigned Commissioners up till 2 o'clock p.m. Saturday, the 26th day of July, 1919, for the repair to the 3-4 Sideroad and 8-9 Concession drain, in the Township of Brooke, County of Lambton. Estimate cost of excavation, \$9,600. Contractors must furnish security for the completion of the work. Plans and specifications may be seen at the office of the Clerk, Lot 16, Con. 9, Brooke Township. Lowest or any tender not necessarily accepted.

L. LINDSAY, R.R. No. 2, Alvinston.
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Commissioners. (c4m)

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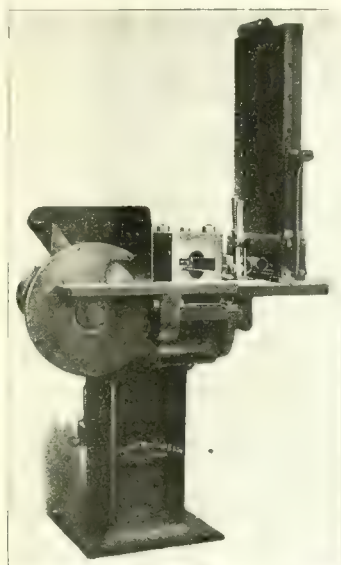
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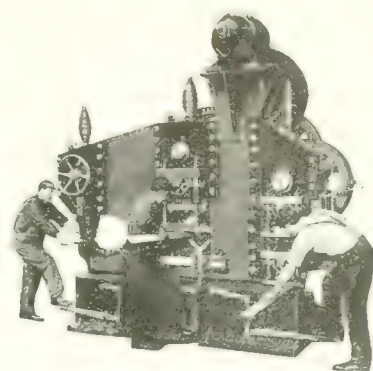


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17"
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swing 19"
17" x 10' New Sidney D.B.G. Quick-Change Lathe, swing
19"
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19" x 10' New Sidney D.B.G. Quick-Change Lathe, swing
21"
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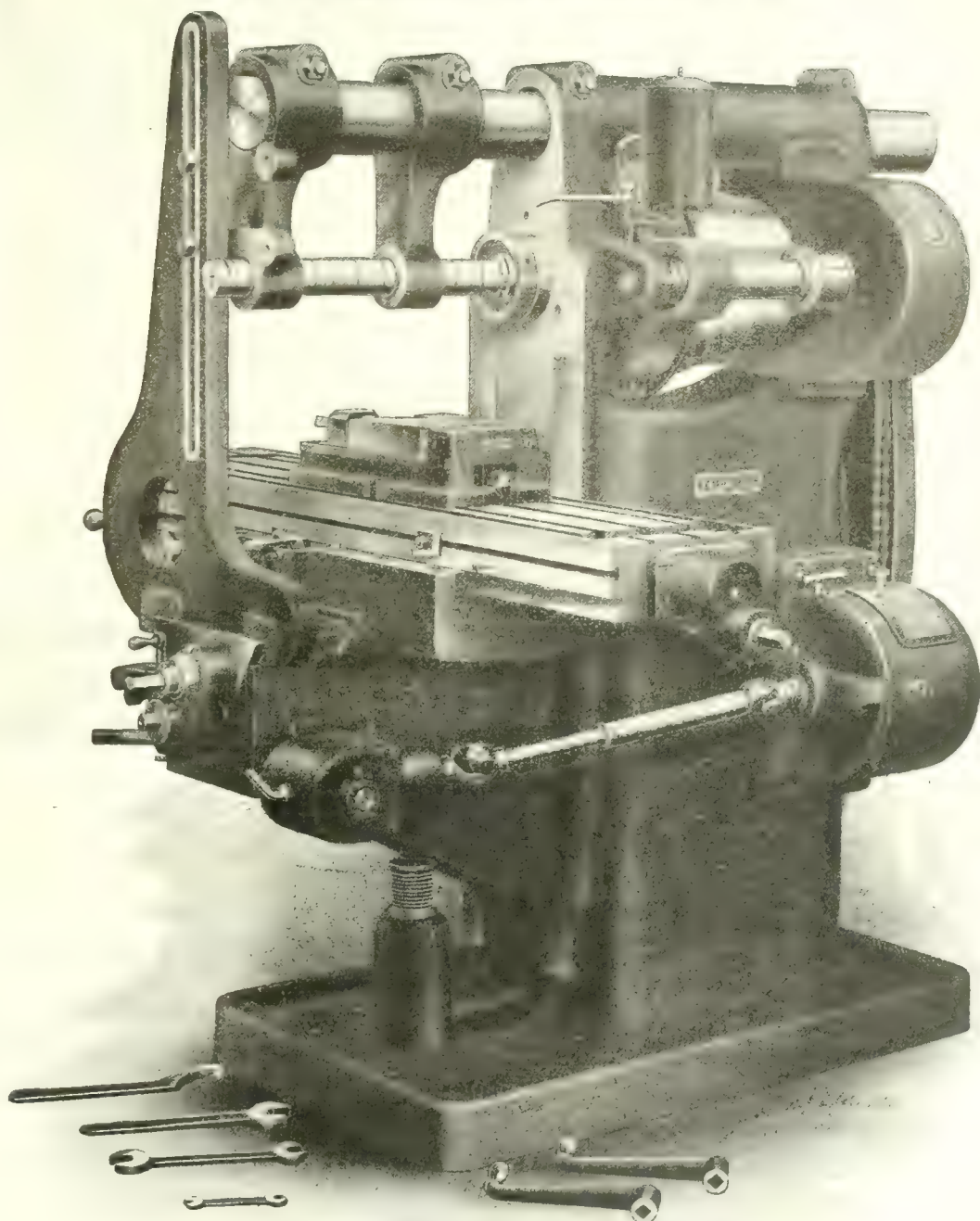
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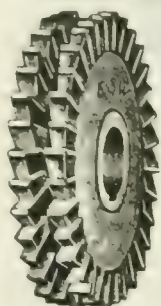
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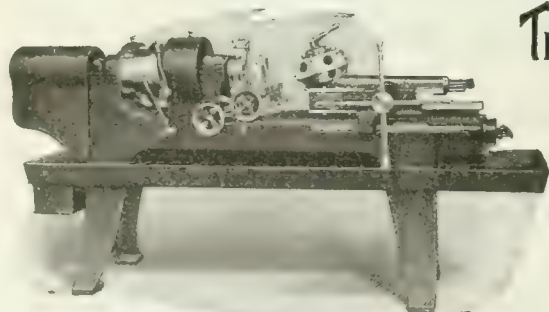
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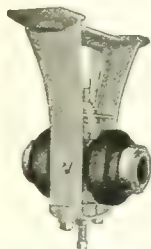
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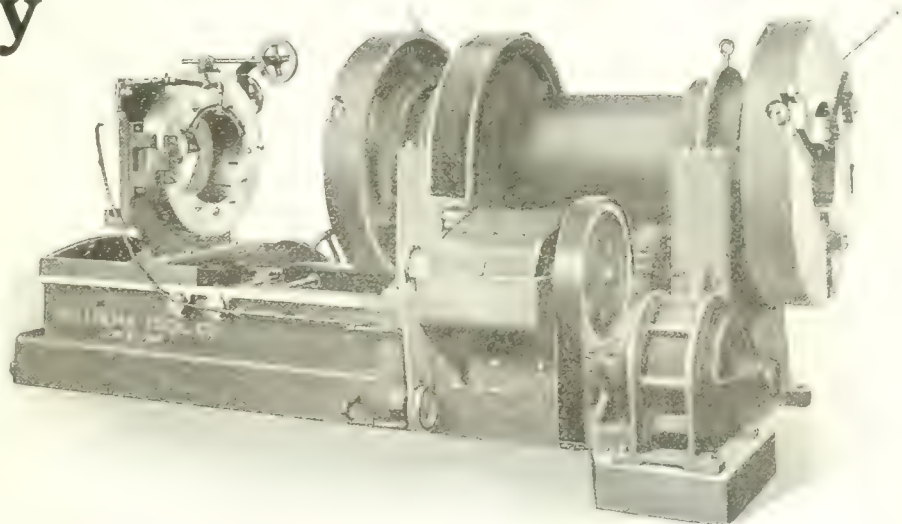
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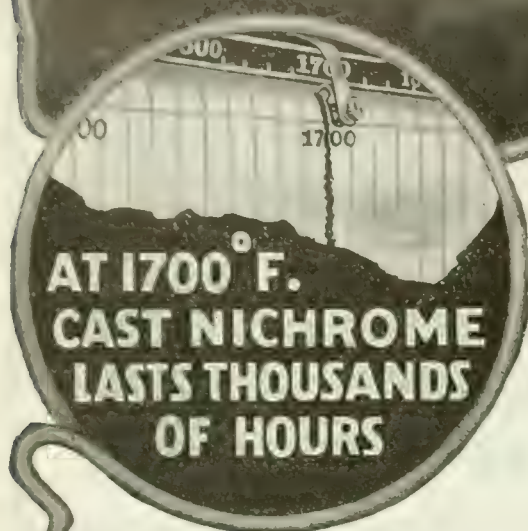
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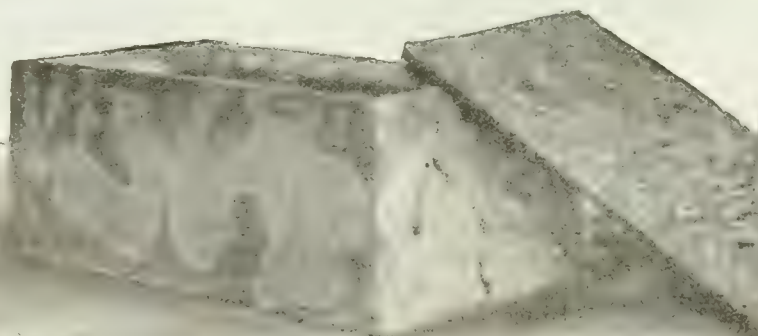
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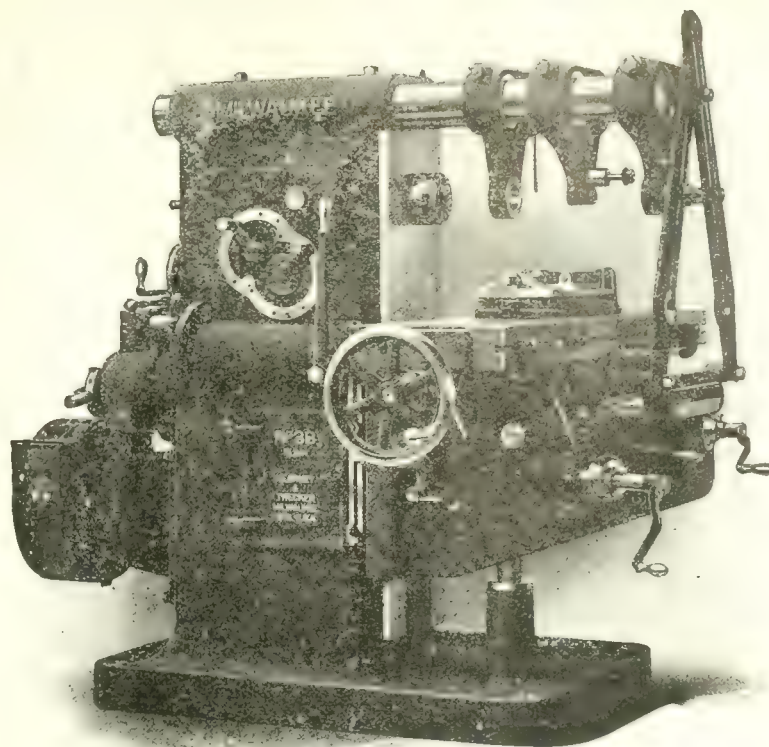
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AT 1700° F.
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GROWS, SCALES
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AND LASTS ABOUT
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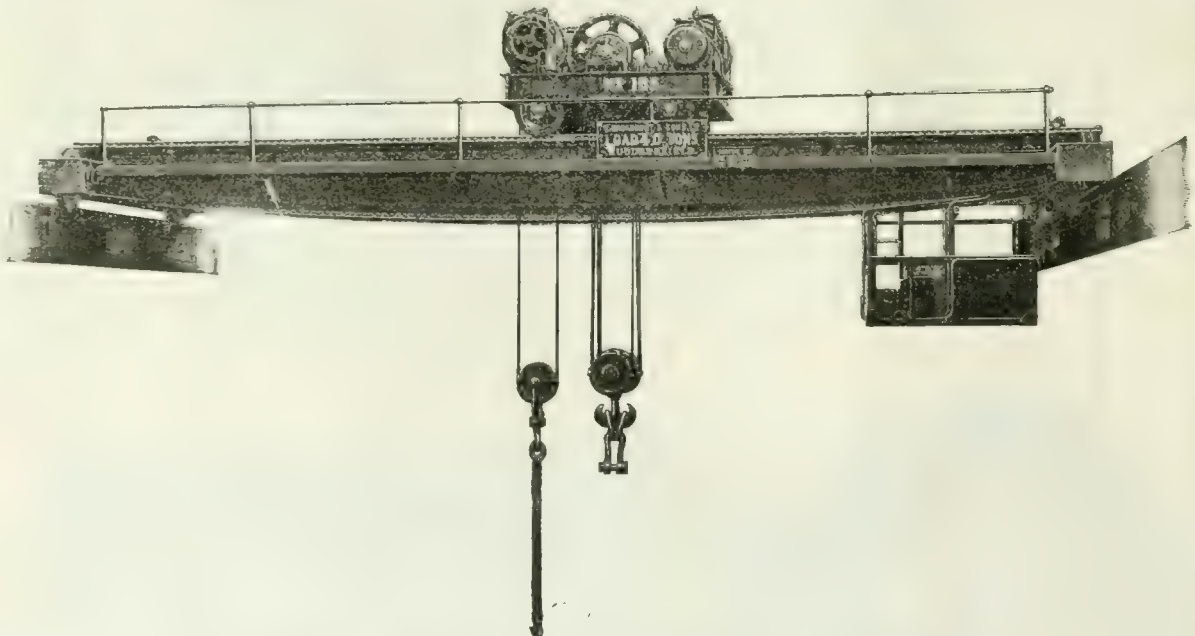
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Have The Maritimes Had Fair Play?

THE Maritime Provinces did not enter Confederation very willingly and it may surprise people in other parts of the Dominion to learn that at the present time the people of New Brunswick and Nova Scotia are not altogether pleased with the results of the bargain. There is a distinct feeling among them that the advantages of Confederation have gone to the other Provinces. In the course of an article in the July issue of MACLEAN'S MAGAZINE, Thomas M. Fraser explains why this feeling has grown and the basis for it.

This article was written for the purpose of letting the other provinces know that the feeling exists but it will be of intense interest to people in the Maritimes. Be sure to read it—"The Spirit of the Maritimes."

"The Land of National Leaders"

An article on the political aspect of the Eastern Provinces and the achievements of their leading statesmen.

"Guarding Our Coast Line"

An extremely interesting description of the measures that were taken to patrol and guard the Atlantic seaboard during the war.

Bonar Law, the man from the Maritimes, who has been the able lieutenant of Lloyd George at all crises in Great Britain, appears on the cover in a handsome three-color reproduction.

Other Big Features of the Number

"With the Snowball Brigade"

By Captain Louis Keene

Just back from Siberia—Captain Keene tells some sensational and intensely gripping things about conditions in that country which the Canadian forces are helping to stabilize. It is a record of international complications, strange atrocities and almost unbelievable living conditions.

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The Review of Reviews

Here are a few of the articles in this splendid department chosen as the best published during the past month in all magazines:

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Will England Become an Agricultural Country?

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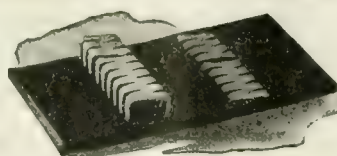
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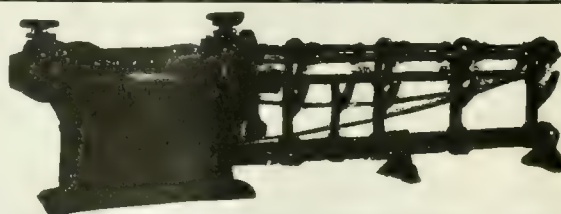
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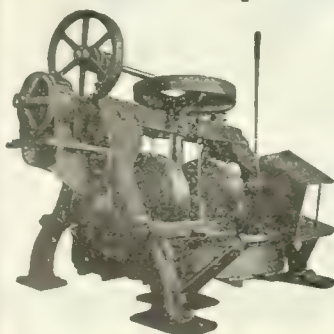
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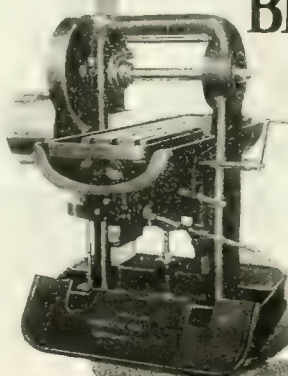


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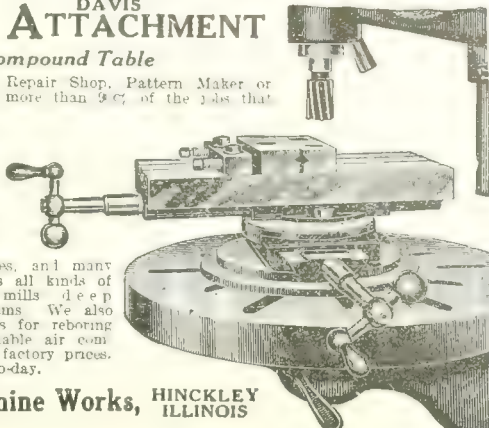
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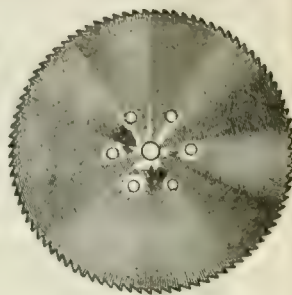
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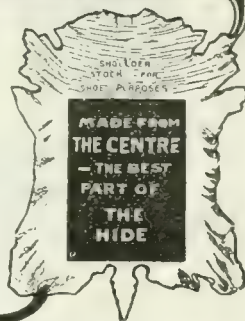
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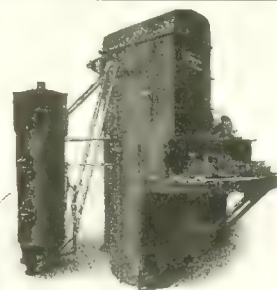
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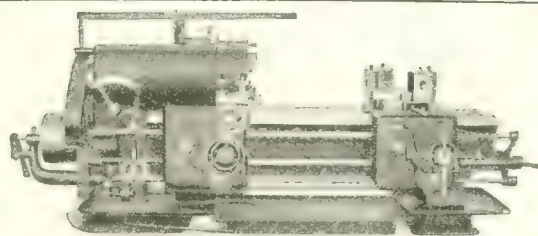
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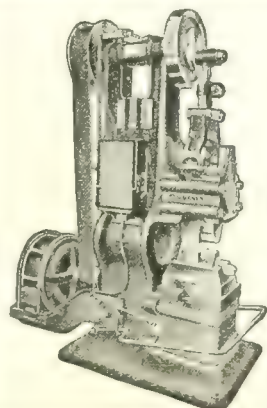
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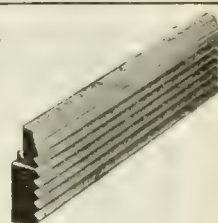
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Jones & Glasgow, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Whitney Mfg. Co., Hartford, Conn.
Williams & Wilson, Ltd., Montreal, Que.

BELTING, CONVEYOR

Can. Consolidated Rubber Co., Montreal.
Raxter & Co., Ltd., J. R., Montreal.
Canadian Fairbanks-Morse Co., Montreal.
Eastwood Engineering Co., Ltd., Toronto.
Graton & Knight Mfg., Worcester, Mass.
Jones & Glasgow, Montreal, Que.
McLaren Belting Co., J. C., Montreal.
Morse Chain Co., Ithaca, N.Y.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.

BELTING, FRICTION AND SURFACE

Can. Can. Rubber Co., Ltd., Montreal.

BELTING, LEATHER

Can. Graton & Knight Mfg. Co., Montreal.

BELTING, STITCHED COTTON DUCK

Dominion Belting Co., Hamilton, Ont.

BELTING, WOVEN

Raxter & Co., Ltd., J. R., Montreal.

Federal Engineering Co., Ltd., Toronto.

BENDING ROLLS, PLUTE & AUGH

Wickes Bros., Saginaw, Mich.

BENDING MACHINERY

B. & S., Ltd., Edinburgh, Scotland.
Bentham & Sons Co., Ltd., Dundas, Ont.
Brown-Biggs Co., Ltd., Hamilton, Ont.
Can. Blower & Forge Co., Kitchener.
Garlock-Walker Mach. Co., Toronto.
Williams & Wilson, Ltd., Montreal.

BLASTING MACHINES, SAND

Garlock-Walker Machinery Co., Toronto.
Lodge A. B. & Co., Hamilton, Ont.
National Mach. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Limited, Montreal.

BILLET MARKERS

Mathews & Co., Jas. H., Pittsburgh, Pa.

BILLETS

Atkins & Co., Ltd., Wm., Sheffield, Eng.
Swedish Steel & Importing Co., Ltd., Montreal.

Algonia Steel Corp., Sault Ste. Marie.
Kaiser-Elison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto.
Norton, Ralph B., Agent, Montreal.

BILLETS, FORGING

Graton & Knight Mfg., Worcester, Mass.
Kaiser-Elison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

BINS, STEEL

Dunn & Warr & Son, Wm., London, Ont.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

BLACKSMITH WORK

James Ballantyne, Montreal.
The Thos. Pink Co., Ltd., Pembroke.

BLANKING

Hy. Hope & Sons of Can., Ltd., Peterboro.

BLASTING MACHINES, SHOT AND STEEL GRIT

Pittsburgh Crushed Steel Co., Pittsburgh.

BLOOMS AND SLABS

Algoma Steel Corp., Sault Ste. Marie.

BLOWERS

Can. Blower & Forge Co., Kitchener, Ont.
Garlock-Walker Machinery Co., Toronto.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Limited, Montreal.

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Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

BLUE PRINTING MACHINERY

Commercial Camera Co., Providence, R.I.
Wickes Bros., Saginaw, Mich.

BOARDS, GLASS CUTTING

Lufkin Rule Co., of Can., Windsor, Ont.

BOARTZ

Joyce Koebel & Co., Inc., New York.

BOLT CUTTERS

Greenfield Tap & Die Corp., Greenfield, Mass.

BOLT CUTTERS

Greenfield Tap & Die Corp., Greenfield, Mass.

Wells Bros., of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

BOOKS, TECHNICAL

MacLean Publishing Co., Toronto.

BOILERS

Dominion Bridge Co., Montreal, Que.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

BOLT CUTTERS AND NUT TAPERS

Aikenhead Hardware Co., Toronto, Ont.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Landis Machine Co., Waynesboro, Pa.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.
Wells Bros., of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal.

BOLTS

Aikenhead Hardware Co., Toronto, Ont.
London Bolt & Hinge Wks., London, Ont.
Morrow Screw & Nut Co., John, Ingersoll.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Co., J. H., Boston, N.Y.

BOLTS, STAY

Morrow Screw & Nut Co., John, Ingersoll.

BOLTS, SPRING SHAKLE

Can. Wicks Co., Ltd., Windsor, Ont.
Morrow Screw & Nut Co., John, Ingersoll.

BOLTS, PATCH

MacKinnon Steel Co., Sherbrooke, Que.

BOLT AND NUT MACHINERY

Bentham & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
Norton, Ralph B., Agent, Montreal.
Williams & Wilson, Ltd., Montreal, Que.
Williams Machinery Co., A. R., Toronto.

BOLT THREADING MACHINERY

Jardine & Co., Ltd., A. B. Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
Vester Tool Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal.

BORING MACHINES PNEUMATIC CYLINDER

Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Wm. & W. Co., Montreal, Que.

BORING MACHINES UPRIGHT AND HORIZONTAL

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Morse Chain Co., Ithaca, N.Y.
Wm. & W. Co., Montreal, Que.

Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Wm. & W. Co., Montreal, Que.

BORING AND TURNING MILLS

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Morse Chain Co., Ithaca, N.Y.
Wm. & W. Co., Montreal, Que.

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BUCKETS, ELEVATOR

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Can. Link-Belt Co., Toronto, Ont.

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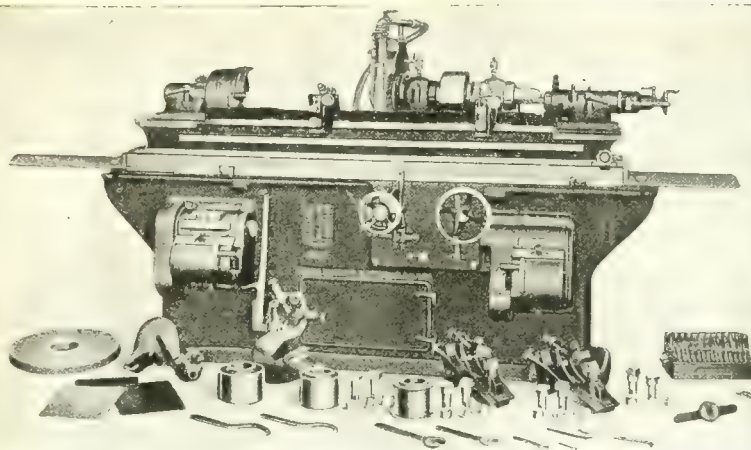
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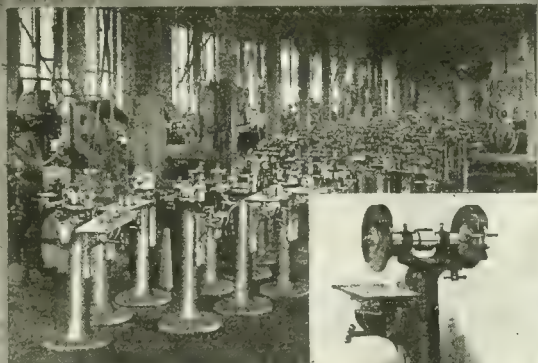
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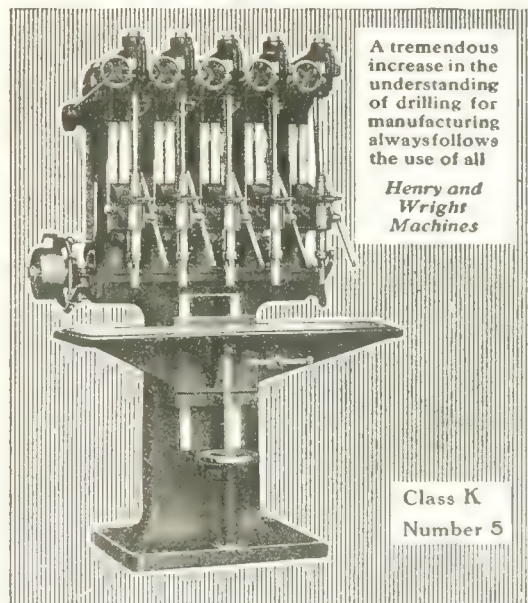


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MacKinnon Steel Co., St. Catharines, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York, N.Y.
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Northern Crane Works, Walkerville, Ont.
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Greenfield Tap & Die Corp., Greenfield, Mass.
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CUTTERS, FLUE

Cleveland Pneumatic Tool Co., Toronto, Ont.

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Oliver Machinery Co., Grand Rapids, Mich.

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Can. Link Belt Co., Toronto, Ont.
Can. Winkley Co., Ltd., Windsor, Ont.
Greenfield Tap & Die Corp., Greenfield, Mass.
H. J. Rogers Machy. Co., South Scituate, Mass.
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DERRICKS

Aikenhead Hardware Co., Toronto, Ont.

Domination Bridge Co., Montreal, Que.

Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

DIAMOND TOOLS

Anderson & Co., of Can., Geo., Montreal, Que.

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Wheel Truing Tool Co., Windsor, Ont.

DIE BLOCKS

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Wells Bros. of Canada, Galt, Ont.

Williams & Wilson, Ltd., Montreal, Que.

DIES, BRASS PRINTING, EMBOS-ING AND LETTERING

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Aikenhead Hardware Co., Toronto, Ont.

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Baker & Co., Inc., H., Montreal, Que.

Butterfield & Co., Rock Island, Que.

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Greenfield Tap & Die Corp., Greenfield, Mass.
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Wells Brothers Co., of Can., Galt, Ont.

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Marshall, Son & Bunney, Toronto, Ont.
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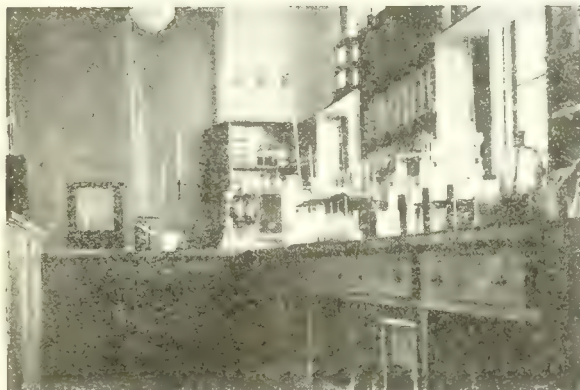
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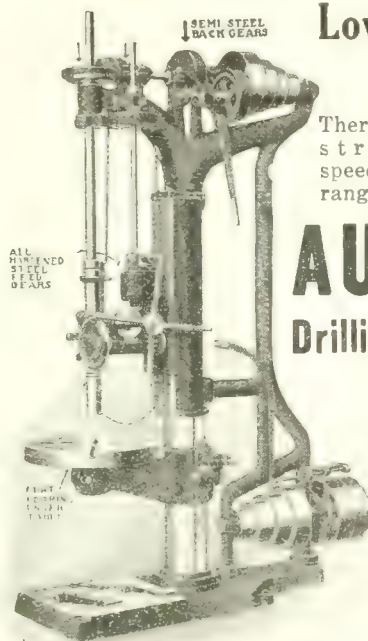
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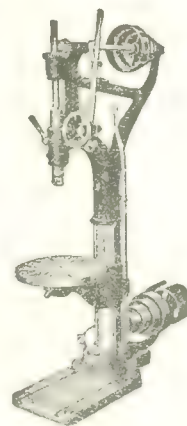
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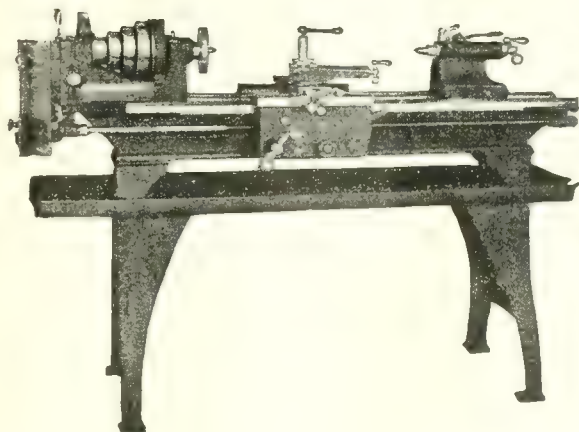
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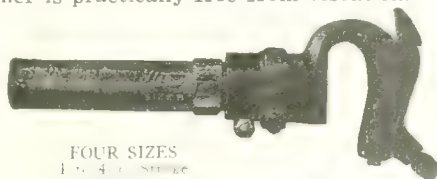
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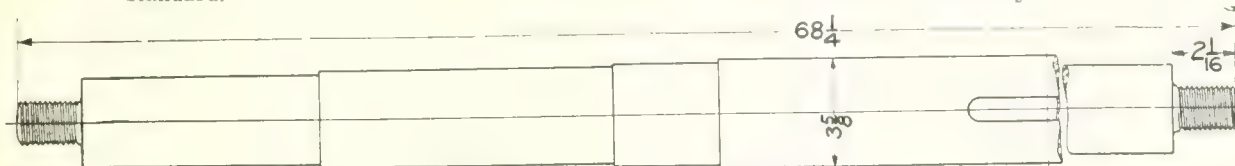
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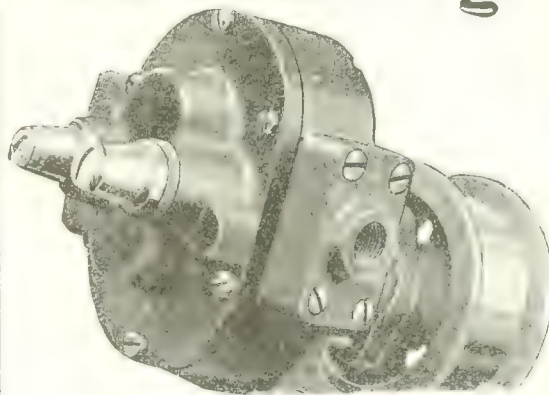
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Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Can.

MACHINERY, HAMMER AND NAIL

Garlock-Walker Machine Co., Toronto, Ont.

MACHINERY GUARDS (See Guards)

MACHINERY REPAIRS

Martin Mach. Co., Hamilton, Ont.
Prest-O-Late Co., Inc., Toronto, Ont.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Can.

MACHINERY, MULTI-DRILLING

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MACHINERY, TRANSMISSION (POWER)

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MACHINES, BELT-LACING

Clippert Belt Lacer Co., Grand Rapids.

MACHINES, ROLLING, BENDING

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MACHINES, RUNNING, BALANCING

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MACHINES, MULTI-BORING

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Marten Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
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Williams & Wilson, Ltd., Montreal, Can.

MACHINE TOOLS

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Cleveland Twist Drill Co., Cleveland.
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Matthews & Co., Jas. H., Pittsburgh, Pa.

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Hoefler Mfg. Co., Freeport, Ill.

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Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Foss Mch. & Sply Co., G. F. F. Montreal.
Hawkins Bros., Inc., Chicago, Ill.
Hendy Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kemp Smith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Ltd., Montreal, Can.

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Beltas Machine Co., Rochester, N.Y.
Williams & Wilson, Ltd., Montreal, Can.

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Gasholt Machine Co., Madison, Wis.
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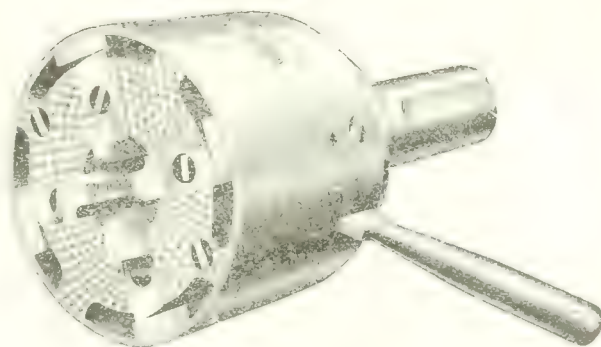
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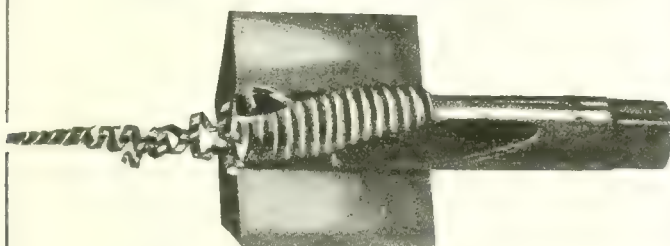
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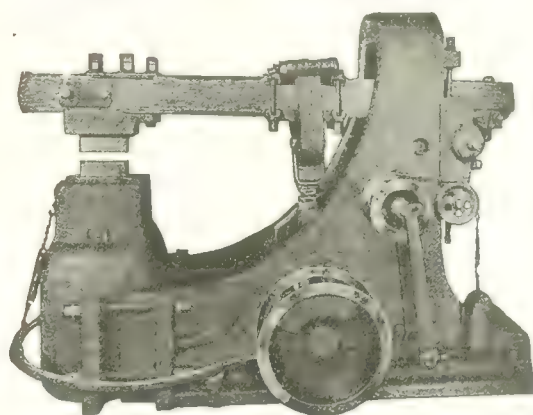
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Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

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Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto.
Metalwood Mfg. Co., Detroit, Mich.
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Stoll Co., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.

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Toledo Machine & Tool Co., Toledo

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Brown, Boggs Co., Ltd., Hamilton.
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.
Perrin, Ltd., William R., Toronto.
Stoll Co., D. H., Buffalo, N.Y.

PRESSES, RUBBER CEMENT
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**PRESSES, STEEL SASH, STEEL
BELT**
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PULLEYS, BELT
American Pulley Co., Philadelphia, Pa.

PULP MILL MACHINERY
MacKinnon Steel Co., Sherbrooke, Que.

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Can. Ingersoll-Rand Co., Montreal, Que.
Darling Bros., Ltd., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
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Perrin, Ltd., William R., Toronto.

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STORAGE**
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Niles-Bement-Pond Co., New York.
Perrin, Ltd., William R., Toronto.
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Stoll Co., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.
Williams Machy. Co., A. R., Toronto.
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Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.
Garlock-Walker Machinery Co., Toronto.
Perrin, Ltd., William R., Toronto.
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Toledo Machine & Tool Co., Toledo.
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Consolidated Press Co., Hastings, Mich.
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Williams & Wilson, Ltd., Montreal, Que.

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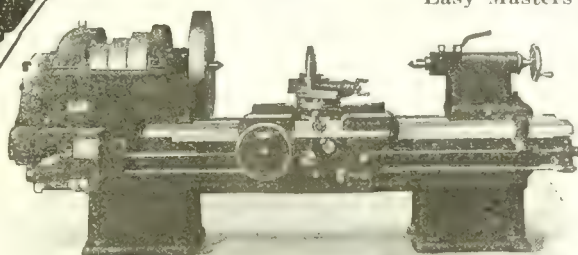
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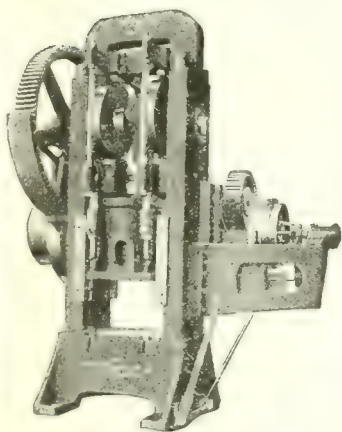
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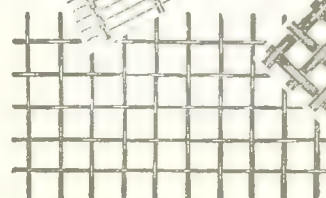
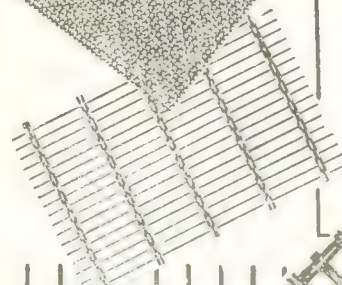
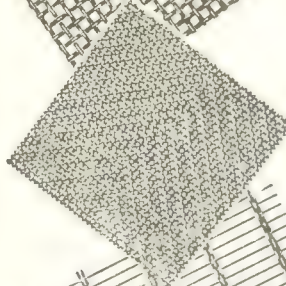
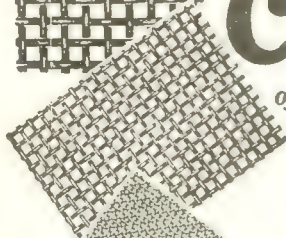
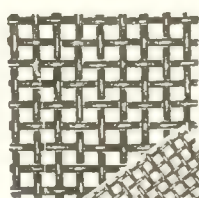
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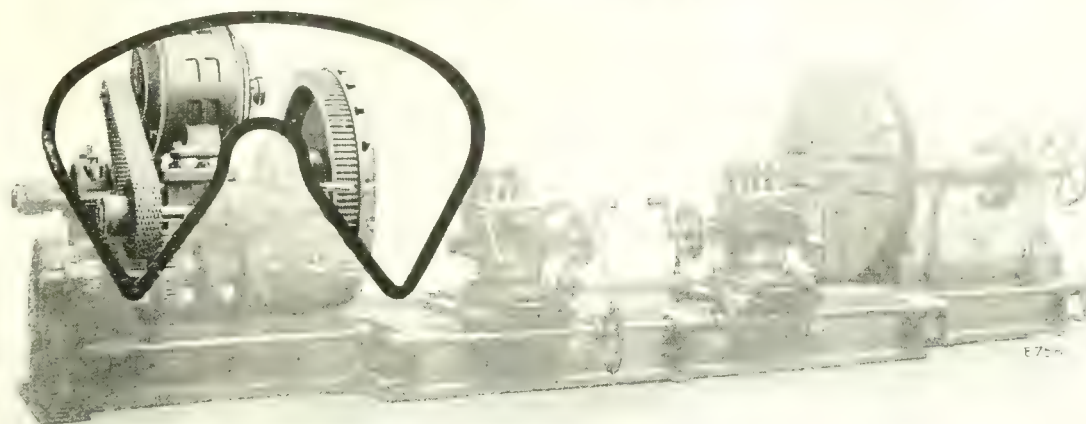
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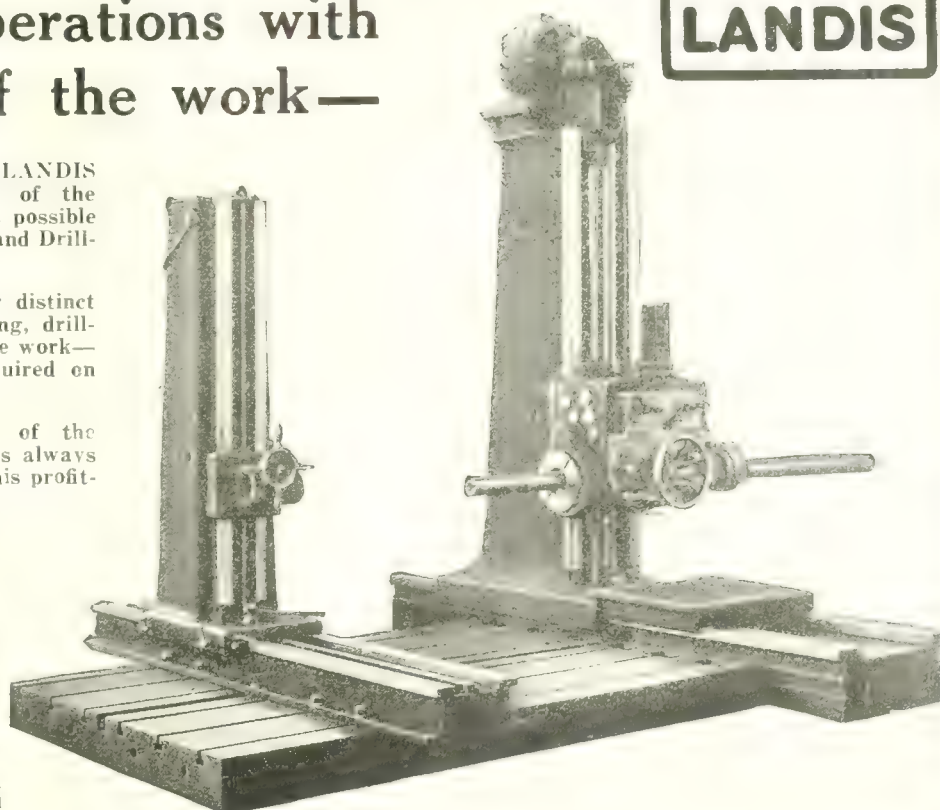
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Greenfield Tap & Die Corp., Greenfield, Mass.

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TOOL HOLDERS

Aikenhead Hardware Co., Toronto, Ont.

Cleveland Twist Drill Co., Cleveland, Ohio.

TOOL POSTS, LATHE

Armstrong Bros. Tool Co., Chicago.

Williams & Co., J. H., Brooklyn, N.Y.

TOOL ROOM PARTITIONS

Canada Wire & Iron Goods Co., Hamilton.

TOOL STEEL

Armstrong, Whitworth of Can., Montreal.

Baker & Co., Inc., H., Montreal, Que.

Can. Fairbanks-Morse Co., Montreal.

Atkins & Co., Wm., Sheffield, Eng.

General Steel Co., Milwaukee, Wis.

Drury Co., H. A., Montreal, Que.

Firth & Sons, Thos., Montreal, Que.

Hawthorne Bros. Co., Boston, Mass.

Kayser-Ellison & Co., Ltd., Montreal.

Marshall, Son & Bunney, Toronto, Ont.

Norton, Ralph B., Agent, Montreal.

Latrobe Electric Steel Co., Latrobe, Pa.

Rice Lewis & Son, Toronto, Ont.

Vanadium-Alloys Steel Co., Pittsburgh.

Vulcan Crucible Steel Co., Alliquippa, Pa.

TOOLS, BENDING

Peck, Stow & Wilcox Co., Southington.

TOOLS, BLACKSMITHS'

A. B. Jardine & Co., Ltd., Hespeler, Ont.

Rice Lewis & Son, Toronto, Ont.

TOOLS, ADJUSTABLE BORING

Kelly Reamer Co., Cleveland, O.

Williams & Wilson, Ltd., Montreal, Que.

TOOLS, ELECTRIC

Independent Pneumatic Tool Co., Chicago.

Williams Machy. Co., A. R., Toronto.

Ford-Smith Machine Co., Hamilton, Ont.

U. S. Electrical Tool Co., Cincinnati, O.

TOOLS, FORMING

Davidson Tool Mfg. Co., New York, N.Y.

TOOLS, PNEUMATIC

Can. Ingersoll-Rand Co., Montreal, Que.

Cleveland P'matic Tool Co., Can., Toronto.

Curtis Pneumatic Machy. Co., St. Louis.

Garlock-Walker Machy. Co., Toronto.

Independent Pneumatic Tool Co., Chicago.

TOOLS, LATHE, PLANNER, SLOTTER

Armstrong Bros. Tool Co., Chicago.

Gisholt Machine Co., Madison, Wis.

Williams & Co., J. H., Brooklyn, N.Y.

TOOLS, SCREW MACHINE

Foster Machine Tool Co., Elkhart, Ind.

TORCHES, STEEL

Armstrong, Whitworth of Can., Montreal.

Prest-O-Lite Co., Inc., Toronto, Ont.

Welding & Supplies Co., Montreal, Que.

TORCHES, GASOLINE, KEROSENE AND ALCOHOL

Turner Brass Works, Sycamore, Ill.

TRACK, PORTABLE STEEL

Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

TRACK SYSTEMS

Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

Northern Crane Works, Walkerville.

TRANSFORMERS

MacGovern & Co., Montreal, Que.

TRANSMISSION CHAIN

Morris Chain Co., Ithaca, New York.

TRANSMISSION MACHINERY

American Pulley Co., Philadelphia, Pa.

Williams Machinery Co., A. R., Toronto.

Can. Link-Belt Co., Toronto, Ont.

Can. Fairbanks-Morse Co., Montreal.

Can. Drawn Steel Co., Hamilton, Ont.

Coventry Chain Co., Coventry, England.

Hamilton Gear & Machine Co., Toronto.

Jones & Glasco, Montreal, Que.

Kennedy & Sons, Wm., Owen Sound, Ont.

Morse Chain Co., Ithaca, N.Y.

Wilson & Co., J. C., Belleville, Ont.

Williams & Wilson, Ltd., Montreal, Que.

TRANSMISSION ROPE

Jones & Glasco, Montreal, Que.

MacKinnon Steel Co., Ltd., Sherbrooke.

Wilson & Co., J. C., Belleville, Ont.

TRANSMISSION TOWERS

Curtis Pneumatic Machy. Co., St. Louis.

Dominion Bridge Co., Montreal, Que.

MacKinnon Steel Co., Sherbrooke, Que.

Northern Crane Works, Walkerville.

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Chapman Double Ball Bearing, Toronto.

Cowan Truck Co., Holyoke, Mass.

MacKinnon Steel Co., Sherbrooke, Que.

Rice Lewis & Son, Toronto, Ont.

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Swedish Steel & Importing Co., Montreal.

Northern Crane Works, Walkerville.

TUBING, SEAMLESS, BRASS AND COPPER

Standard Tube & Fence Co., Woodstock.

Tallman Brass & Metal Co., Hamilton.

TUBING COILERS, FLEXIBLE METAL

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Sleeper & Hartley, Inc., Worcester, Mass.

TURRET MACHINES, LATHES

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Garlock-Walker Machinery Co., Toronto.

Greenfield Tap & Die Corp., Greenfield.

Oliver Mch. Co., Grand Rapids, Mich.

Pratt & Whitney, Hartford, Conn.

Wells Bros. of Canada, Galt, Ont.

Williams & Wilson, Ltd., Montreal, Que.

TUNGSTEN FILAMENT COILING MACHINERY

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TURBINES, HORIZONTAL

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Warner & Swasey, Cleveland, O.

Garvin Machine Co., New York.

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Rice Lewis & Son, Toronto, Ont.

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Brown, Boggs Co., Ltd., Hamilton, Can.

Ford-Smith Machine Co., Hamilton, Ont.

Garlock-Walker Machinery Co., Toronto.

Jardine & Co., A. B., Hespeler, Ont.

National Machy. Co., Tiffin, Ohio.

Canada Machinery Corp., Galt, Ont.

Niles-Bement-Pond Co., New York.

Williams Machy. Co., A. R., Toronto.

Williams & Wilson, Ltd., Montreal, Que.

VALVE LEATHERS

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VALVE GRINDERS (PNEUMATIC)

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VALVES, HYDRAULIC

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Williams Machy. Co., A. R., Toronto.

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VISES, BENCH

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Becker Milling Machine Co., Boston, Mass.

Foss Machy. & Sply. Co., G. F., Montreal.

Williams & Wilson, Ltd., Montreal, Que.

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Atkins & Co., Ltd., Wm., Sheffield, Eng.

Aikenhead Hardware Co., Toronto, Ont.

Butterfield & Co., Rock Island, Que.

Marshall, Son & Bunney, Toronto, Ont.

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Williams & Co., J. H., Brooklyn, N.Y.

Williams & Wilson, Ltd., Montreal, Que.

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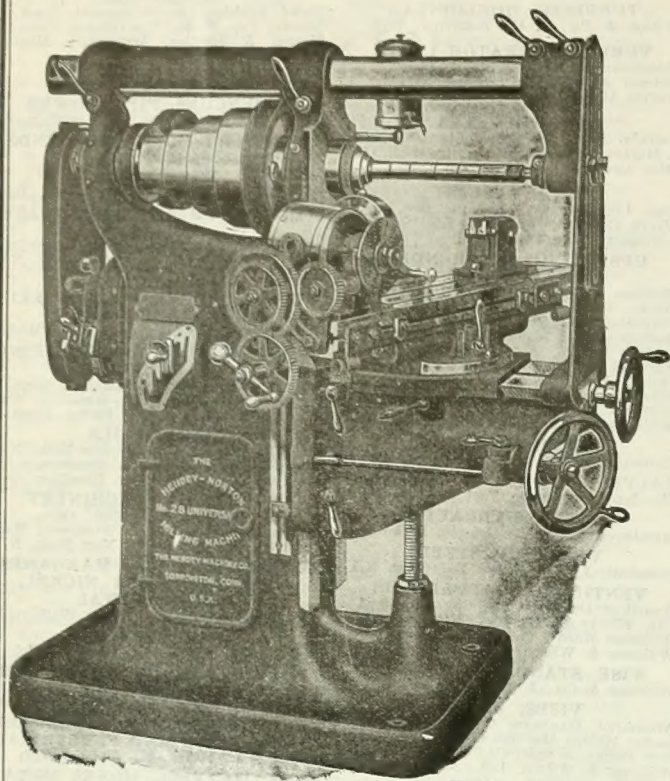
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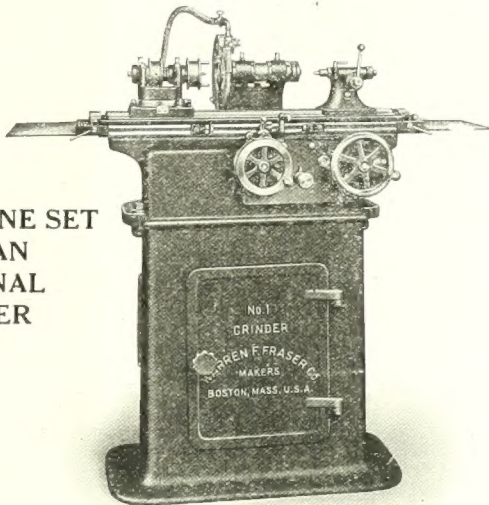
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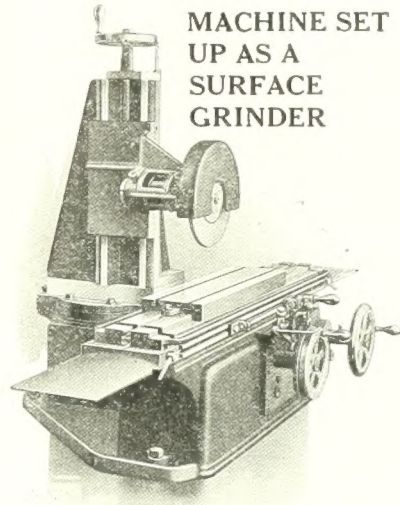
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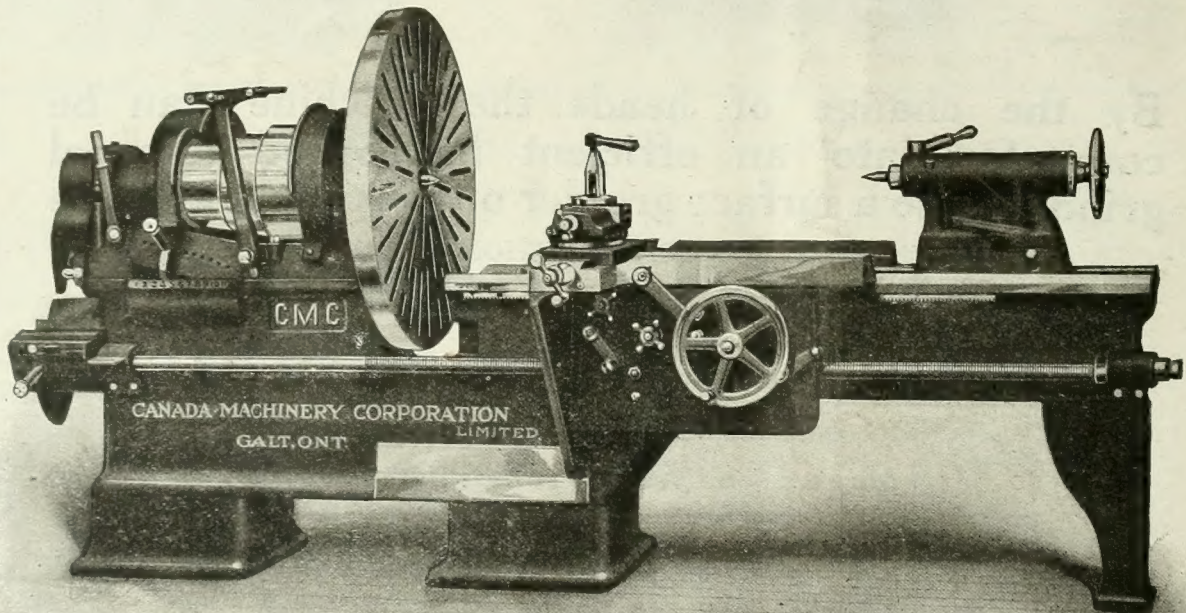
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